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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

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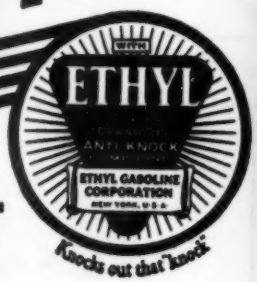

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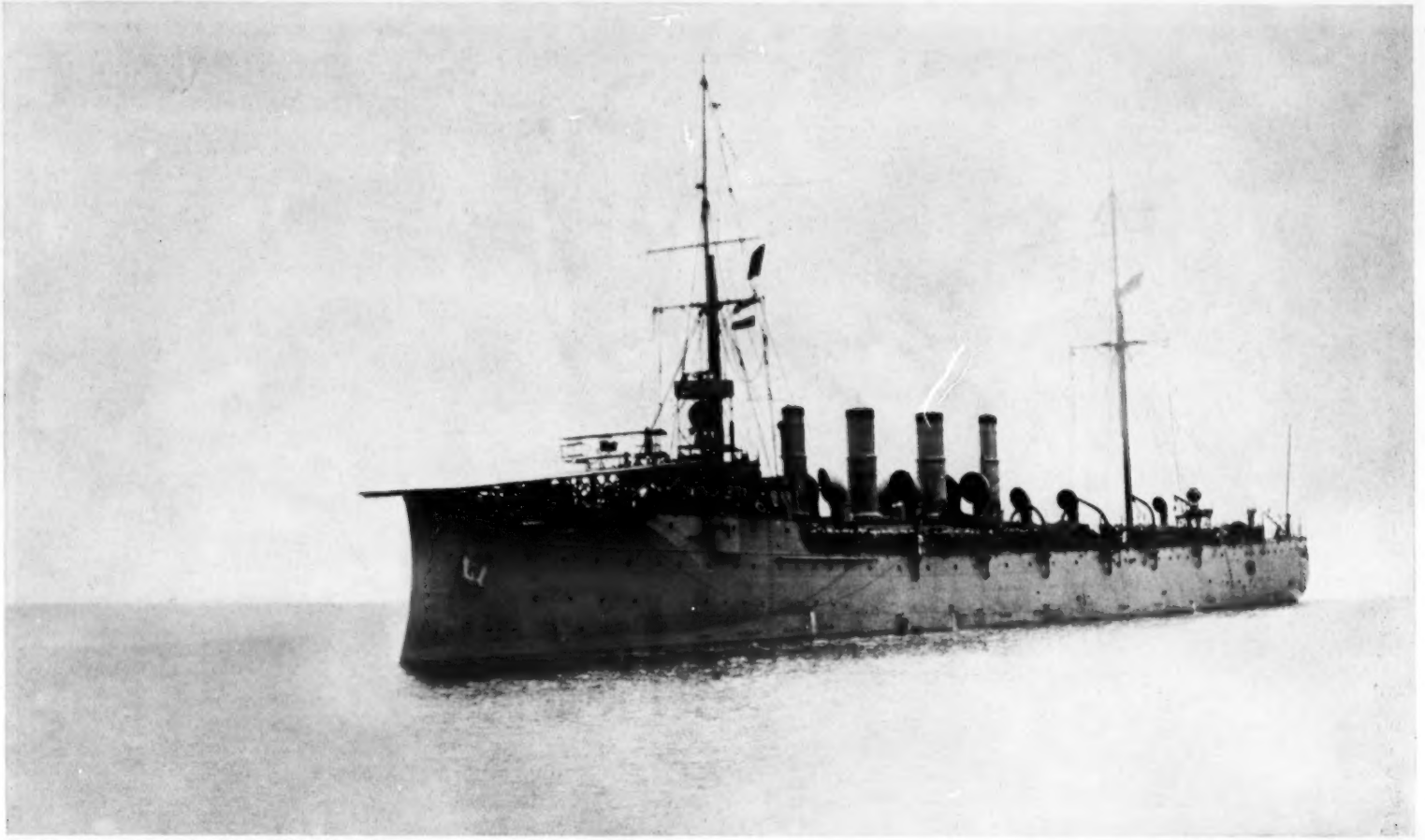
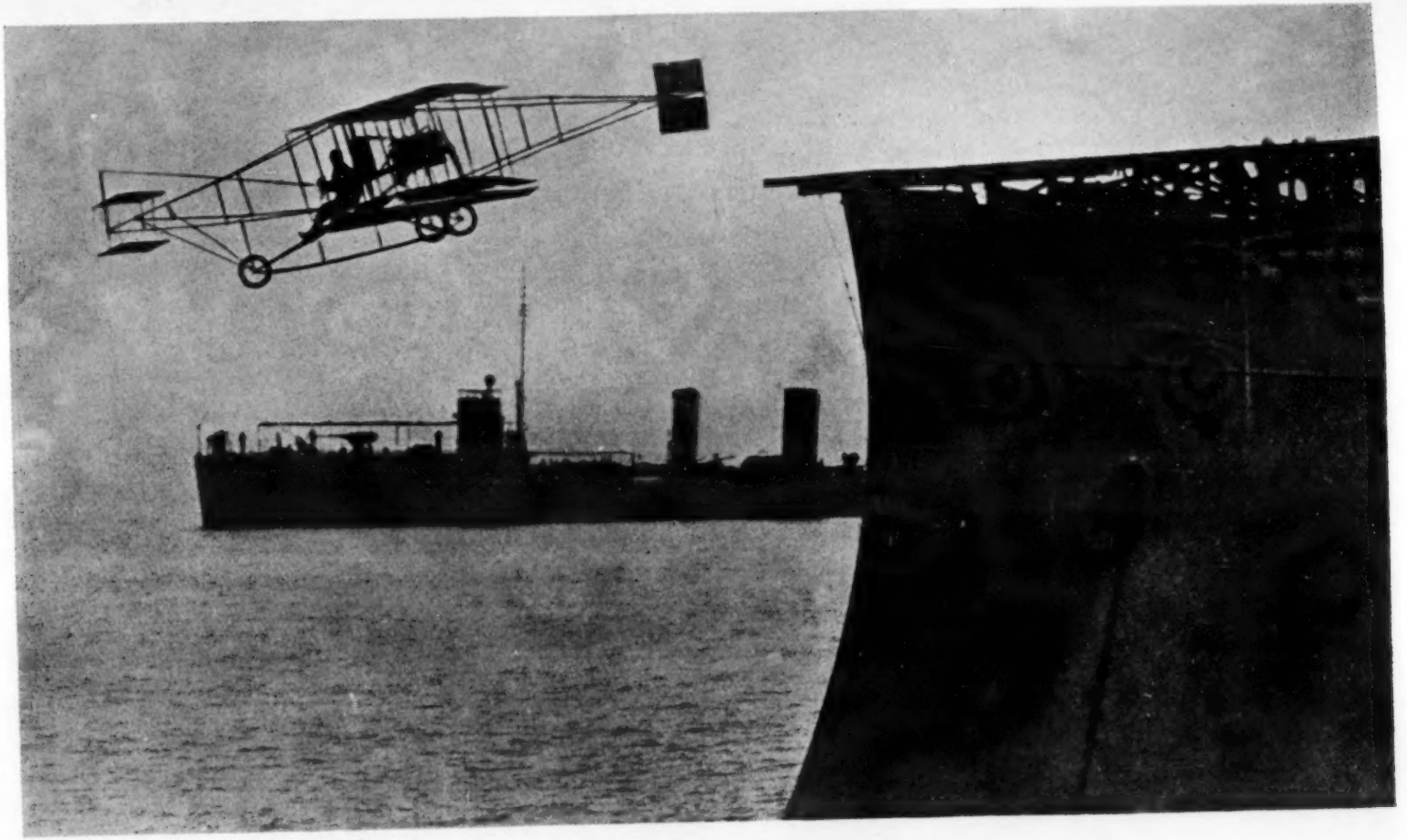


Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

ELY READY TO COMMENCE THE FIRST FLIGHT OF AN AIRPLANE FROM A SHIP
NOVEMBER 14, 1910. (See page 1462.)

NOVEMBER 14, 1910. (See page 1462.)



Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

THE CRITICAL MOMENT OF ELY'S FLIGHT

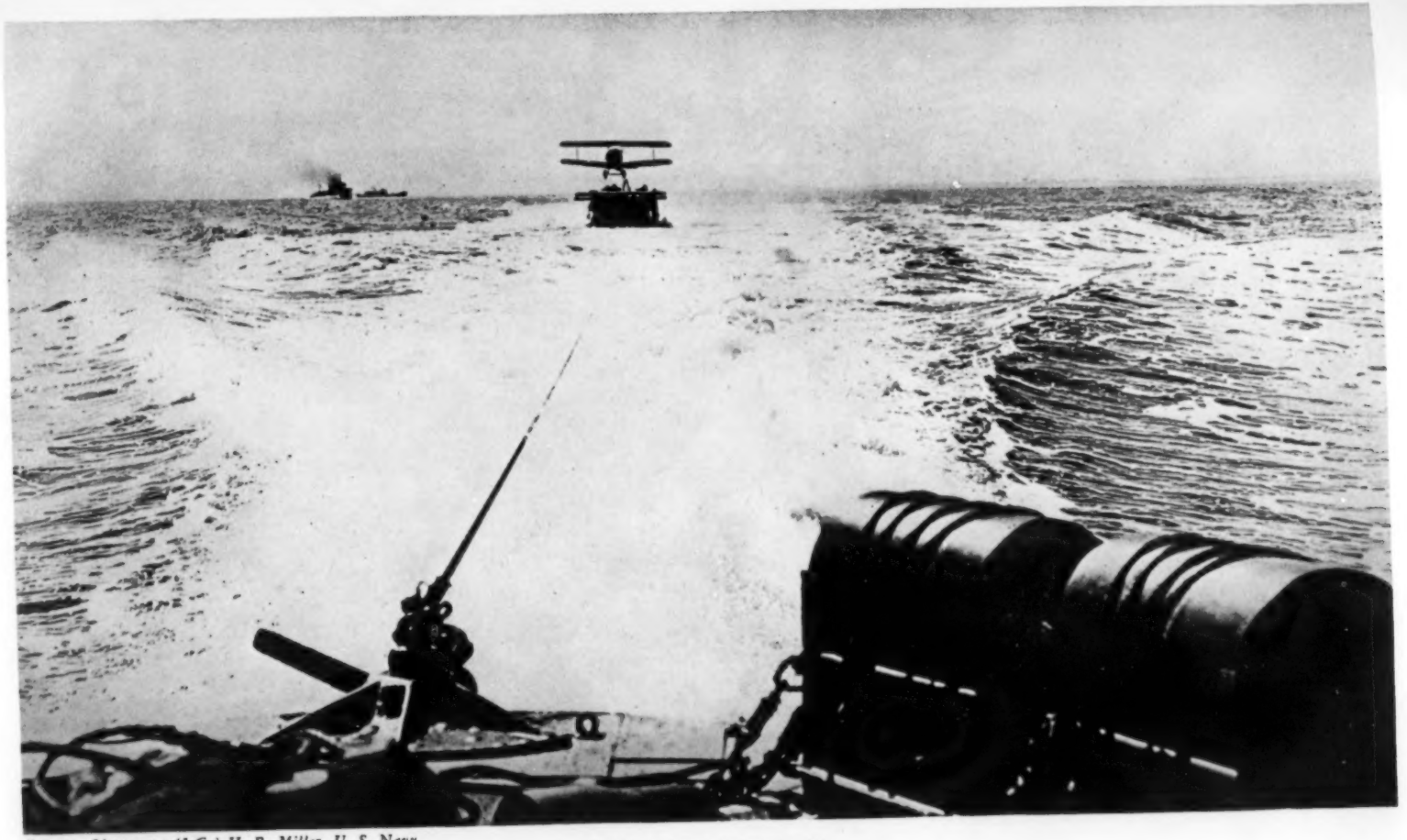
Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

From a photograph—
Naval Records and Library

A MOBILE SEAPLANE BASE

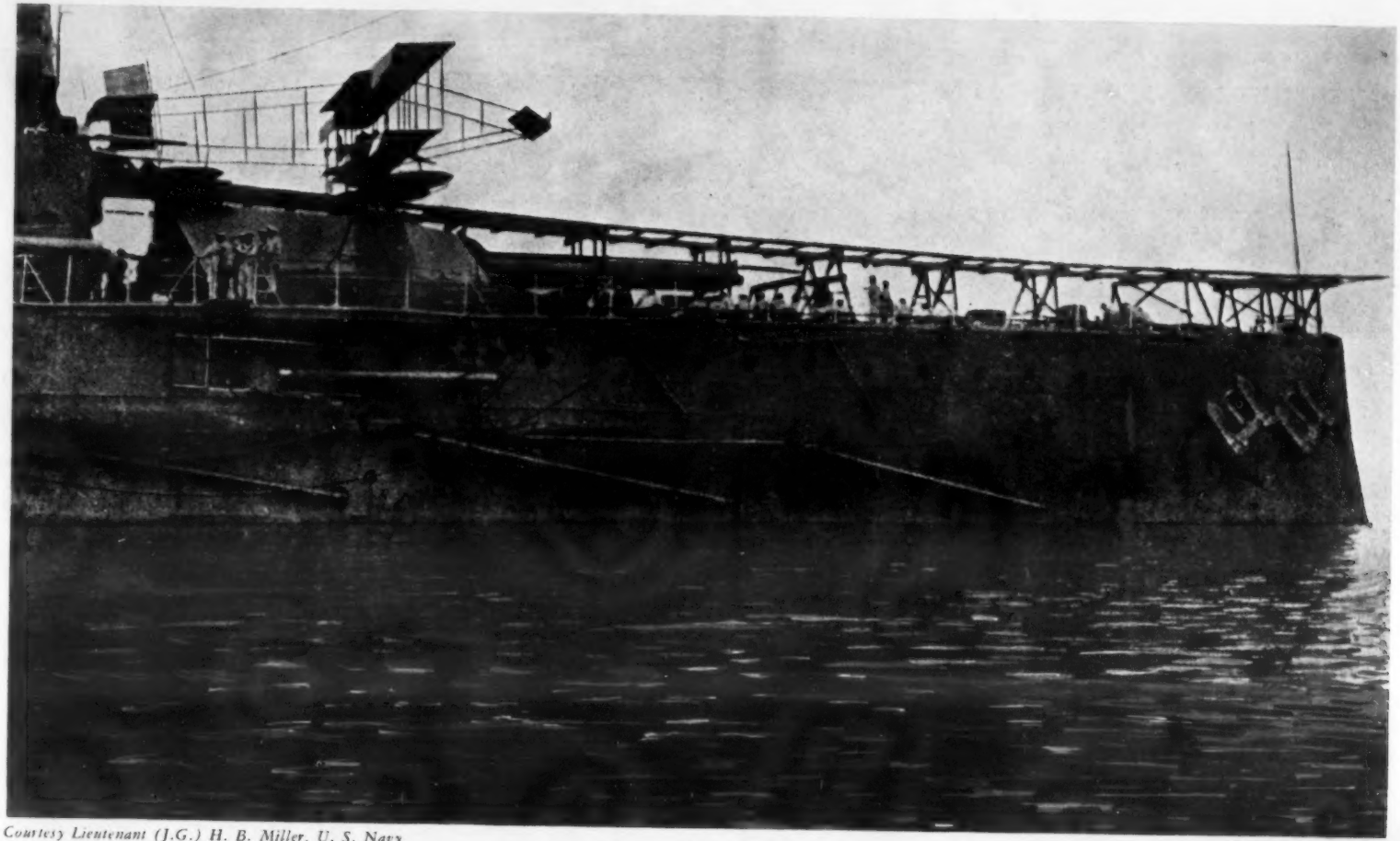
A fighting plane being towed by a destroyer across the North Sea during the war in order to bring it within range of the German coast. (See page 1466.)

A fighting plane being towed by a destroyer across the North Sea during the war in order to bring it within range of the German coast. (See page 1466.)



Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

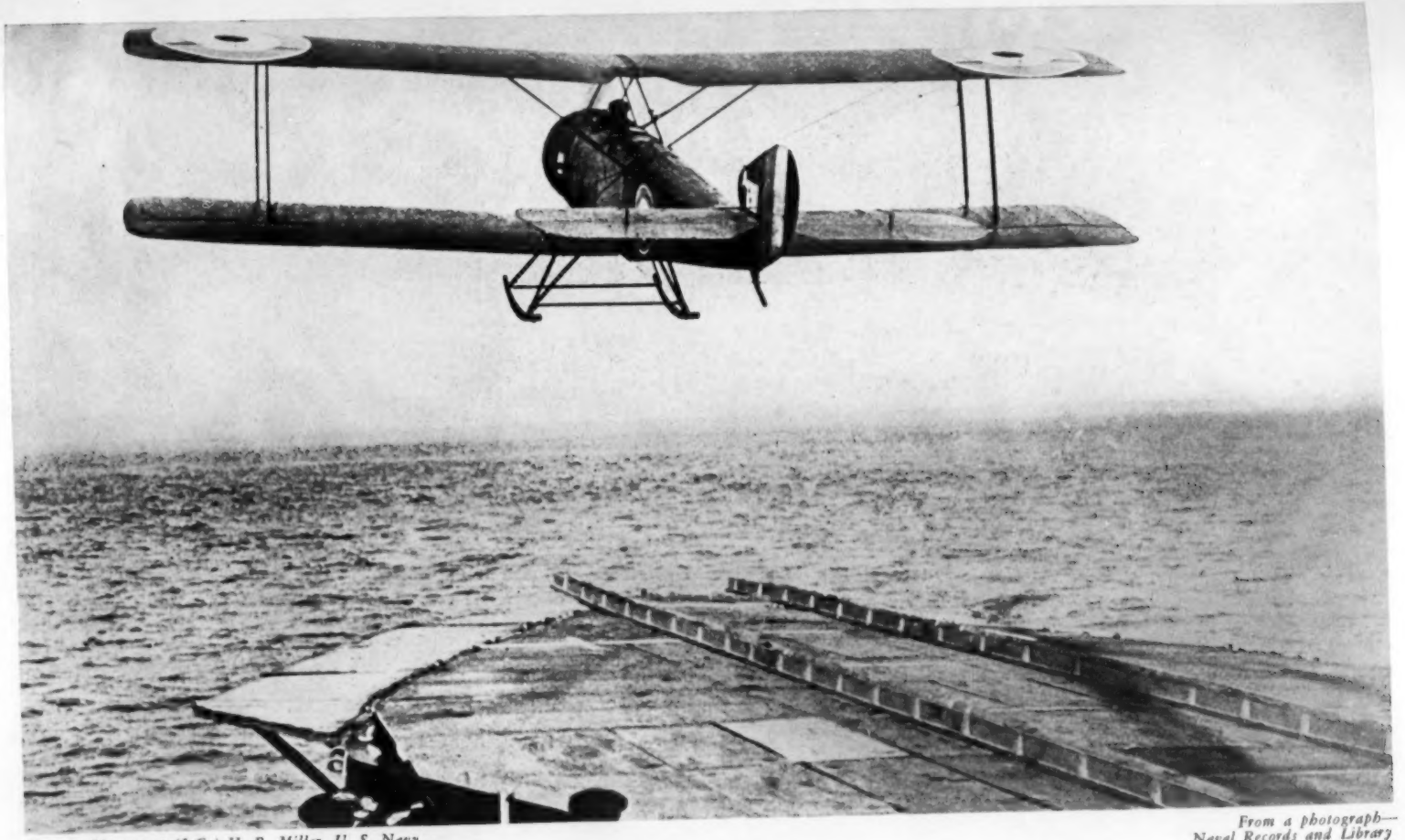
THE PLANE TAKING OFF
The destroyer is towing at 36 knots.



Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

From a photograph—
"Naval and Military Record"

AN EARLY SEAPLANE LAUNCHING PLATFORM ON A BRITISH BATTLESHIP (See page 1465.)

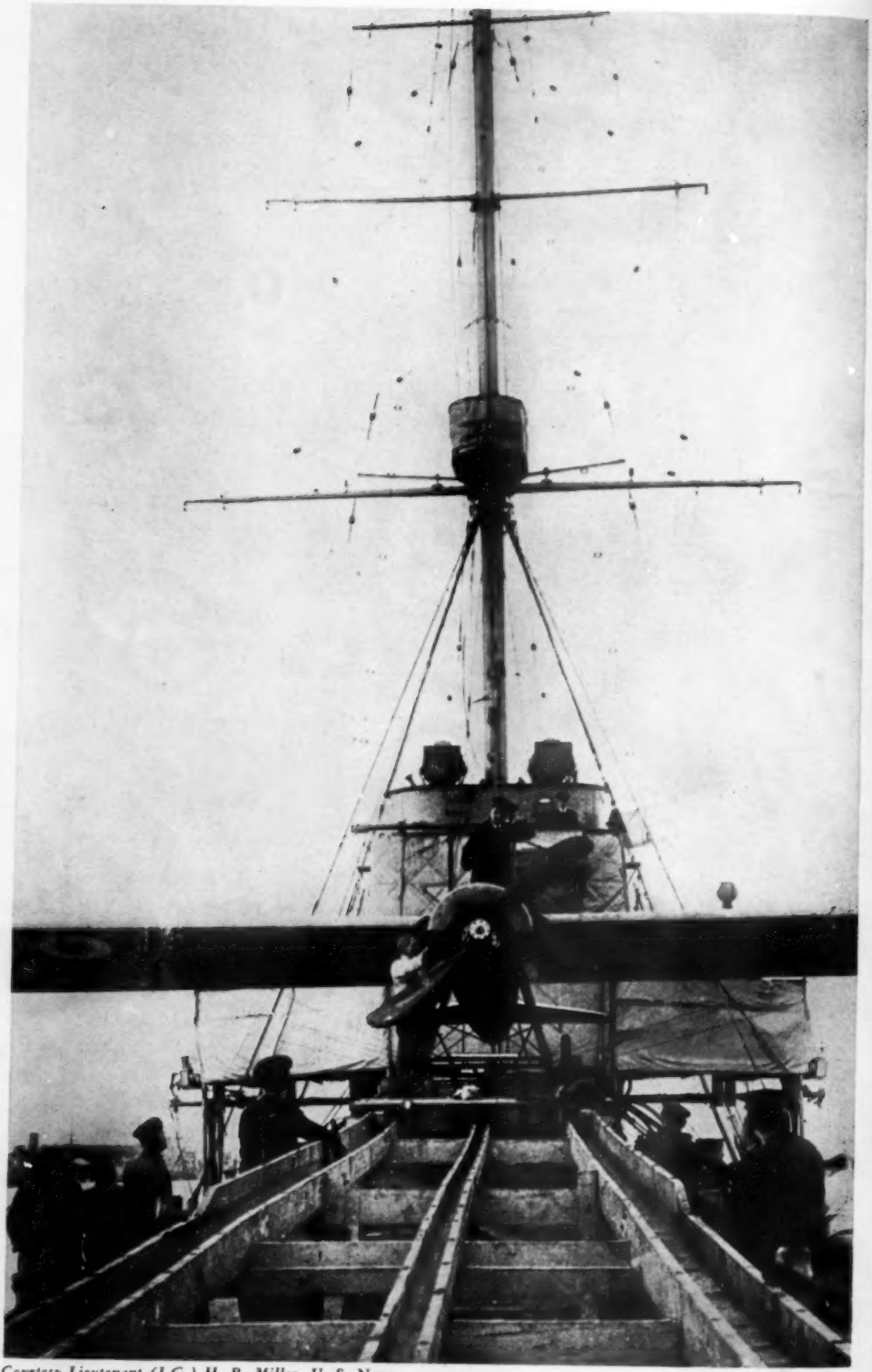


Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

From a photograph—
Naval Records and Library

A BRITISH EXPERIMENT

A trough was built up on ships where there was no flush deck. (See page 1465.)



Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

From a photograph—
Naval and Military Record

THE RUNWAY ON BOARD H.M.S. *AURORA*

This shows the airplane on the truck ready for flight. (See page 1465.)

UNITED STATES
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PROCEEDINGS

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COVERED WAGONS OF THE SEA

BY LIEUTENANT (J.G.) H. B. MILLER, U. S. NAVY

IN THE early days of aviation, the application of the airplane to land warfare was readily apparent. Landing fields could be made available at any desired point. The navies of the world, however, were not so fortunate. It must be remembered that in 1910 the seaplane had scarcely emerged from the scramble of aëronautical inventions which flooded the patent office.

With practically everyone in the country marveling at this new instrument of the air it is not surprising that a certain number attempted to find ways of sending aircraft to sea with the fleet. Nor is it strange that three separate parties should have independently arrived at the same solution to the problem at practically the same time.

It was the New York *World* which first startled the country with the announcement that it was going to sponsor a project in which an airplane would be flown from the deck of a ship. The idea of the proposed flight swept the country by storm. Anything new which promised a thrill to the watchers on the side lines was eagerly received and this scheme was the most daring yet conceived. It so happened that the Hamburg-American Steamship Line had also delved into the future sufficiently to realize the possibilities of flying mail off a ship long before reaching port. These conclusions were maturing at about the same time the *World* made its announcement and the two organizations wisely combined their efforts. The steamship *Kaiserin Auguste Victoria* was chosen to make the first test which was set for November 5, 1910.

At the direction of J. A. D. McCurdy, the pilot, a rough plank platform was erected upon the stern of the liner. The Navy agreed to furnish two destroyers to safeguard the flight. However, President Taft canceled the sailing orders of the plane guards the day before the test because of refusals of private projects in previous cases. The day scheduled for the test was stormy, and, as the plane would have been hard put to handle well under the most favorable conditions, the flight was wisely postponed. It was announced that the experiment would surely take place at the end of November.

The third person to ponder the application of the airplane to a ship was Captain W. Irving Chambers, U. S. Navy. Long an ardent advocate of aviation, he had observed several air meets for the government. Being a seagoing man, he dreamed of the airplane as a seagoing machine. He, too, decided that the use of a permanent deck was the logical method for launching a scouting airplane from a ship. His means were limited and, while he was searching for an available ship, the *World* made known its plans. Captain Chambers made no efforts to instigate a race for the accomplishment of this experiment. He did, however, want to see the project arrive at a successful conclusion. With the postponement of the *World's* attempt, the Navy went ahead with its plans.

The U.S.S. *Birmingham*, a cruiser, was made available for the test. She was ordered

to the navy yard at Norfolk where a temporary platform was erected on the forecastle. The size of the ship permitted a platform only 83 feet long while the width was but 24 feet. The deck had a downward slope of 5°, which placed the forward edge 37 feet above the water.

All that was needed now was an aviator and a plane, neither of which the Navy possessed. Captain Chambers hurried up to Halethorpe, Maryland, where an aviation meet was in progress, to secure these important ingredients to his experiment. Wilbur Wright had left the field, but he was soon reached by telephone. He emphatically refused to attempt the flight and no amount of persuasion would alter his decision.

As if by divine arrangement, Eugene Ely happened to be passing by. Here was a pilot who had gained a reputation for being a sound flyer when under the auspices of Glenn Curtiss, and now, flying under his own management, he was gaining a large share of the plaudits of the crowds. Captain Chambers explained the situation and Ely agreed to make the flight. Long distance calls sent word to the Navy Department. Urgent wires called upon the crew of the *Birmingham* to make more speed.

In the meantime, the *World* reconsidered and made known its intention to attempt the epochal flight from the decks of the steamship *Pennsylvania* on Saturday, November 12. It had developed into a race now! The newspaper chartered a private yacht to safeguard the plane once it left the deck of the ship. Army and Navy observers were invited to attend the performance, for the *World* was sincerely attempting to prove the usefulness of the airplane in naval warfare. The same experiment would prove the case of the Hamburg-American Line which contributed the *Pennsylvania* for the test.

The plane was to fly from the ship one-half hour after she had sailed on her regular transatlantic trip. Arrangements were made for news of the take-off to be sent ashore by wireless and there announced to the excited crowds that lined the Battery. Anxious to assure himself that his power plant was in good shape, McCurdy ordered his mechanic to test out his engine once more. Engaged in oiling the rocker arms for the last time, the mechanic set his oil can down on the framework of the plane and cranked over the engine. On the first revolution the propeller struck the heavy oil can and threw it far aside. The entire plant was immediately shaken as if suddenly stricken with ague. One of the blades had been broken off during the contact with the can. It was beyond repair. Failure! With a heavy heart McCurdy superintended the hoisting of his plane back over the side and on to the dock. Thus does fame strike closely to some individuals. The *Pennsylvania* steamed out to sea as a normal vessel and not as the first airplane carrier.

Captain Chambers waited with much interest for the results of the *World's* activities. A wire informed him of McCurdy's accident. Taking the train he went to Norfolk and worked with renewed vigor, making final preparations for the Navy's attempt.

The morning of November 14 dawned far from favorable for the impending flight. The weather was unsettled with low clouds and occasional showers of rain and hail. Nevertheless, the officer of the deck broke out a working party of men before reveille with orders to "roll Mr. Ely's aëroplane down the dock and hoist it aboard." As the *Birmingham* steamed down to Hampton Roads, Ely installed his favorite four-cylinder engine in the plane. Thus, without an air test of the installation, he was going to attempt the novel flight. The craft's past performance, however, was excellent. It had already won Glenn Curtiss $10,000 by making the memorable flight from Albany to New York.

The original plans were to steam out into Chesapeake Bay and head the ship into the wind at a speed of 10 knots. The plane was to take off and fly to the Norfolk Navy Yard along a path of destroyers. The weather was so thick that the landmarks were obscured and the cruiser anchored off Old Point Comfort to wait for a possible improvement. Shortly after noon the sky cleared most encouragingly. The destroyers were sent out on station and the ship got under way to begin the flight operations, but an unusually heavy fall of rain overtook them and operations were again delayed.

Weather reports indicated that a storm could be expected on the following day. It thus became imperative that the experiment be carried out as scheduled. At about three o'clock in the afternoon the lowering southern sun peeked through the clouds for a few moments. It was decided to begin operations at once. The destroyers once more set out at full speed to take their positions.

Ely put on his life preserver and climbed

into his craft to test out the engine. As his propeller reached full speed, the slip stream disconcerted those on the bridge considerably and the process of getting the ship under way was slowed down. The anchor chain was slowly coming aboard with much clanking. Impatient and eager, Ely once more turned his engine up full. Glancing around to make sure that he was clear he gave his mechanic a nod of his head, which was the signal to release the securing cable of the plane.

Only a 57-foot run was available for him to take off. Down the deck he rolled slowly gathering speed. In the meantime, the wind had shifted to slightly athwartship and was now causing the pilot some difficulty in maintaining a straight course down the narrow platform. Nearer and nearer came the deck—and still the plane was not flying! It was too late to stop. As the machine reached the end of the runway it leaped into space and began to settle.

Ely, sitting in the flimsy outrigger, nosed his plane down for the water. If his craft left the deck without flying speed, he had planned to allow it to drop far enough to give his wings the lift which would carry him safely ashore. Down, down, he went. The 37-foot clearance was nearly used up. At last, satisfied that his faithful machine would respond to the controls, he pulled back on the elevators. Obeying his touch, the craft hesitated in its plunge, quivered and began to level off. Too late, however, to get away cleanly, for the wheels touched the water with a loud splash which drenched the pilot to the skin. Both propeller tips struck the spray and were splintered, but the engine never faltered and the plane began to climb away from the water's surface.

The aviator lost his bearings due to poor visibility. Not knowing how badly his craft had been damaged in its contact with the water, he decided to land at his first opportunity. A broad, sandy beach loomed up ahead and he came down safely on the north side of Willoughby Spit after a flight of four minutes.

The first flight from a "carrier" had been made. Ely asked no compensation for his services. He was rewarded with a letter from Secretary of the Navy Myers for performing the experiment which was described as "being valuable for the possibilities of naval scouting."

To complete the test, it was decided to have a plane fly aboard a ship. Glenn Curtiss, who had moved his forces to San Diego, was consulted on this more difficult experiment. Ely, in the meantime, had rejoined the Curtiss interests and was naturally chosen to make this second flight.

The cruiser *Pennsylvania,* already in San Francisco Bay, was ordered up to the navy yard at Mare Island to be fitted out according to the requirements of Ely and Curtiss. A wooden platform 120 feet long and 32 feet wide was built on top of the after 8-inch turret, with the forward end 5 feet higher that the after end. At the stern the deck sloped down abruptly at an angle of 30°. This ramp was intended to prevent a crashed plane from falling into the ship's propellers and is still used on modern-day carriers. At the side of the platform were fitted guard rails to prevent the plane running overboard. A huge canvas screen was erected at the forward end of the runway to stop the plane and safeguard the pilot if the machine over ran the deck. Canvas nets were stretched along the side to catch the machine if it jumped over the rails.

In the original plans the plane was to be stopped by the upward slope of the deck and the large canvas net. It soon became apparent that additional methods for braking must be provided. It was finally decided to use a series of sandbags which would progressively add resistance to the plane's movement. Accordingly, twenty-two pairs of 50-pound sandbags were rigged up. At intervals of three feet lines were stretched taut across the deck and suspended about twelve inches above it. At each end was attached a sandbag. In this way, seventy-five feet of the platform's surface was covered with athwartship lines. The Curtiss plane was fitted with three pairs of flat steel hooks. A metal air tank was secured to either side of the plane and a skid was placed forward to prevent nosing up if it should land in the water. Otherwise it was a normal landplane with rubber landing wheels.

It was originally planned to make the attempt while the ship was under way, but these plans were changed at a conference with Ely. On the morning of January 18, 1911, the *Pennsylvania* was lying at anchor in San Francisco Bay. In spite of a light 10-mile wind blowing down the bay the cruiser was headed toward the Golden Gate, riding to a flood tide. This was the worst

possible condition for the experiment, as it would force Ely to land down wind. In spite of the unfavorable wind, the confident pilot took off from Presidio field.

Flying down the bay, and to leeward of the *Pennsylvania,* he turned around and began his approach to the smallest landing field yet known. The tail wind had shifted slightly across his course and gave him some trouble in flying straight on to the center line of the deck. If he failed now, naval aviation would receive a tremendous setback, for, during the preparations, both flyers and newspapers did not hesitate to flay the Navy for this attempt. Endangering a man's life! Too hazardous! Airplanes were not built for the sea!

When seventy-five feet from the cruiser, Ely steadied down and came on at the platform, straight as an arrow. The crowds which were perched all over the ship's superstructure were too fascinated at the sight to utter a sound. Those too close to the platform now began to edge away as they watched the plane flying straight at them. No use taking a chance!

Pulling his plane up sharply to clear the ramp, Ely closed his throttle and waited for his craft to settle downward. His speed of thirty-nine miles an hour over the deck was sufficient to carry him over the first eleven lines rigged to stop him. Settling, however, his machine struck the deck and began to roll. The hooks on the plane were held down to the deck by bungee cord. Scraping along the platform they engaged the athwartship lines.

As the plane moved forward, the sandbags of the engaged lines were pulled along the deck. Each three feet of forward progress brought another hundred pounds of resistance into action. The 1,000-pound plane had insufficient momentum to struggle against this load and came to a stop as it picked up the twenty-second line. After this 30-foot run it still had fifty feet to go before it reached the end of the platform. The airplane carrier had arrived!

The astonishment of the crowd was manifest by its complete silence. Then, realizing that the test had been successfully accomplished, a roar went up that reached the eager audience on the beach. Taking up the chorus, whistles passed the word ashore and soon the entire city was rejoicing. Telegraphs and cables immediately got into action and the naval boards of all the important powers were set to pondering upon this upstart, aviation.

After staying on board for forty-five minutes, Ely had his plane turned around. The stern wind now helped him and he took off in the manner of a veteran. His machine leveled off when ten feet above the water.

It was evident that if planes were to be operated from war vessels in a manner such as Ely's, many of the turrets would be placed out of commission. Other means had to be devised if the offensive power of the battleship which carried the planes was not to be reduced measurably. It was suggested that seaplanes alone be used for they could be hoisted over the side and back aboard when their operations were completed. Seaplanes, however, were undeveloped at this time and for a while it appeared that they would always be fragile.

Others thought that landplanes would furnish the eventual solution of the problem. Naval authorities were divided into two schools of thought. One maintained that it would be better to make the battleship self-sufficient by providing space for launching and landing planes on each individual man-of-war. The second group thought it would be better and more efficient to provide a central base such as a ship devoted exclusively to aviation purposes. In this thought we have the kernel of the idea of the modern airplane carrier.

Lieutenant la Point of the French Navy, in 1912, accurately predicted the future carrier when he said, "In order to be of any real value such a ship must be a great vessel with enormous deck space and with a speed equal to that of the fleet."

Captain Chambers now turned his attention to the catapult as a means of launching planes from the confined space of a ship. In this he saw the elimination of the large, cumbersome deck which interfered with the use of the guns. The burden of developing the carrier now shifted to Great Britain, with France and Germany taking some interest in it. The United States was not to join in this work until after the conclusion of the war.

A year after Ely's memorable flight, Commander C. R. Samson of the Royal Navy flew a Short biplane equipped with wheels from a temporary platform mounted on the deck of H.M.S. *Africa* while she was at anchor in Sheerness Harbor. These experiments became more advanced and on May

8, 1912, Samson and Lieutenant Malone made two flights from H.M.S. *Hibernia* while she was under way at 12-knots speed. A Farman plane fitted with pontoons mounting small runner wheels was used on this occasion.

In the meantime, Glenn Curtiss had developed the seaplane to a degree that it could survive a moderate sea. Moreover, he had flown his hydroplane out to the U.S.S. *Pennsylvania* where it was hoisted on board. Lowered over the side, he flew ashore thus proving that any ship, without special equipment, could be fitted with a detachment of seaplanes. With this in mind, the French Navy set aside the repair ship *La Foudre* to be used for their aviation forces. This was the first ship to be placed at the exclusive disposal of aviation personnel. No attempts were made to launch planes from her decks. Seaplanes were operated and these were lowered over the side by means of booms.

The British continued their experiments and in 1913 many flights were made from the cruiser *Hermes*. A Caudron seaplane with an 80-horsepower engine was used for these tests. The floats of the craft were mounted on small wheeled trucks which rolled down narrow troughs fitted on the forecastle of the cruiser. As the plane attained air speed and mounted aloft the trucks continued on their way and fell overboard. These tests were fairly successful but the British also decided that the guns were interfered with and that tests on a normal war vessel were impractical.

During the course of these experiments a proposal was made to the English government by William Beardmore and Company to construct a ship for the express purpose of carrying seaplanes. This suggestion was held in abeyance until some definite conclusion could be reached concerning the results of the *Hermes* trials. Upon the abandonment of the long launching platform and, influenced somewhat by the French, the English in 1914 purchased the freighter *Ark Royal* and fitted her out with ten seaplanes. The attempt to fly planes off a deck was definitely given up for the time being.

The advent of the World War brought home to the British the enormous possibilities of the plane carrier. The fuel capacity of seaplanes based in England did not permit their use in an offensive effort against the German coast. To offset this disadvantage, they took over several fast channel steamers and fitted them out with equipment for handling seaplanes. Among them were the *Engadine*, *Empress*, and *Riviera*. Planes from these vessels carried out a raid against the German dirigible base at Cuxhaven on Christmas eve, 1914. The airships were not located, but the threat of future raids weakened the morale of the cities on the coast. The results of this attack were invaluable to the Allies. True, the material damage was not excessively large, but the threat of repeated raids was sufficient to cause the withdrawal from the front of an effective force of fighting planes for the purpose of defending the German coast.

The British converted the steamship *Campania* into a carrier during the latter part of 1914 by fitting her to carry and operate seaplanes, and providing a 120-foot flying-off deck in the bow. She had an elevator for lowering her planes to the storage space below. With a capacity of seven reconnaissance and six fighting planes she was a powerful potential threat. Unfortunately, her slow speed of 22 knots allowed her to accompany the fleet only under the most favorable conditions. It is to be observed that the *Campania* was fitted with a flying-off deck. Further experiments with mother-ships had convinced the naval authorities that the North Sea was generally too rough to permit satisfactory seaplane operations. It thus became necessary to launch planes from the deck of a ship.

In April, 1915, a Sopwith seaplane was flown from the decks of the new carrier. This plane was of the type which had won the Schneider cup race the preceding year. As before, the pontoon was mounted on a small truck fitted with wheels. When the craft took the air after a short run, the truck rolled on and fell into the sea.

The usefulness of aircraft for scouting was becoming more and more evident. The time had come for planes to accompany the fleet on its excursions and routine sweeps of the North Sea. As a test, H.M.S. *Revenge* shot a target practice with an observer in a seaplane controlling the gunfire of the ship. The results were excellent. Officers in the fleet became enthusiastic about this new function of the naval plane and urged that each major ship be supplied with one. During the Allied campaign at Gallipoli and the Dardanelles several converted mother-ships were used, though they suf-

fered heavy losses. Kite balloon ships were also used during this offensive. The Germans were especially desirous of sinking any ship that was fitted to carry planes and were successful in torpedoing the old *Hermes* off the British coast.

During the battle of Jutland in May, 1916, the mother-ship *Engadine* was the only plane carrier operating with the fleet. In the early phases of the fighting she put over a Short seaplane equipped with a 225-horsepower Sunbeam engine. The plane did some useful observation work, even though the range of both the craft and its radio was limited. Had suitable planes been available to the English the High Seas Fleet would probably not have been able to make its getaway under cover of the smoke and haze.

The Admiralty's answer to the need for more plane carriers was the conversion of the partially built cruiser H.M.S. *Furious*. As first designed, she had only a forward flying-off platform. Her complement of four Short seaplanes and six Sopwith scouts on pontoons were flown from the ship with ease, but because of lack of suitable hoisting gear it was only with difficulty that they could be taken aboard. To solve this problem attempts were made to fly landplanes on board over the forward deck. As the pilot rounded the bridge he would skid across the vessel and attempt to align his plane with the center line of the landing deck. Frequently the handling crew would actually pull the plane out of the air. Practically every landing resulted in a more or less serious accident and this form of returning the planes to the ship was quickly abandoned. The first fatal accident from carrier landings resulted from these experiments.

Further, platforms were built on the turrets of practically all ships of the Grand Fleet larger than the light cruiser. These platforms were so short that they did not interfere with the operation of the guns. A 50-foot run was considered long enough in most cases and from these Sopwith Camels flew regularly. The 150-horsepower engine with which these craft were equipped could barely pull the plane into the air before striking the sea. Nevertheless, Sopwith two seaters fitted with radio were later used from these improvised decks. All these landplanes were normally operated close to shore where they could land safely. It was planned, however, that if these machines were launched far at sea they were to end their flight by landing alongside a destroyer where the personnel would be picked up.

By the close of the war as many as fifty landplanes were taken to sea by the Grand Fleet. It was particularly desired to use these planes against Zeppelins. Heretofore the heavy seaplanes had tried in vain to reach the altitude so easily attained by the lighter-than-air craft. Such an occasion arose in August, 1917, when the *L-23*, commanded by Captain Dinter, was shot down off the Danish coast by a plane launched from an English light cruiser. A high percentage of deck planes were lost. The strain on the aviators assigned to this duty was enormous. To provide them with some degree of safety, flotation gear was rigged in each plane, consisting of rubber bags which could be inflated by the pilot after he had landed in the water. Sufficient buoyancy was sought for a floating period of twelve hours. This was nearly as great a factor of safety as could be provided by a seaplane.

A sore point with the British was the fact that the German coast lay just outside the bombing range of her aircraft. In an attempt to convey aircraft closer to the objective, efforts were made to develop a small speed boat which could carry a plane. No provision was made for a forward run of the aircraft. Its engines were to be opened full out when the motor boat had worked up to its maximum speed and headed into the wind. It was thus hoped to give the plane sufficient air speed to lift itself out of the boat and maintain itself in the air. Although the trials worked out very well the rough seas under actual operating conditions prevented the boat from attaining its maximum speed. The frail craft proved unable to carry out the plans of the designers.

Another method was to mount scout planes on light barges which were towed by destroyers at full speed. The barge never permitted the aircraft to have a run of more than fifteen feet, but the trials were entirely successful. The operating conditions in open water proved to be too severe and the attempt was abandoned, not without having waged one successful action. The *L-53*, commanded by Captain Proelss, was watching with great curiosity a destroyer towing an empty barge. It failed to see the little scout that had just taken the air. One burst from the fighter's machine gun was sufficient to send the airship to its doom.

Another scheme was to tow huge lighters loaded with fully equipped seaplanes to a point within striking distance of the German North Sea coast. Here sea valves were to be opened which would flood the lighters, thus allowing the planes to drift off the deck into the sea. During one of the experiments photographs of the proceedings were taken by a Zeppelin. As the element of surprise was removed the system was given up.

As we have seen, landplanes had been flown from the decks of both carriers and men-of-war, but they could be landed only on shore or alongside a vessel. In any case, their usefulness to their ship was ended for the time being. Seaplanes were slightly better off. They could leave the longer decks of the carriers, but they were forced to land alongside their mother-ship and be hoisted aboard. This required that the ship stop dead in the water, a dangerous procedure in the war zone. Besides the sea was frequently too rough to permit such a maneuver. This brought about an early demand for a ship which could not only launch a plane but also receive it on board without damage. Landings on the forward deck of the *Furious* had failed. Obviously the solution of the problem was to construct a landing deck on the stern of the vessel.

In 1918 a 300-foot flying-on deck was added to the stern of the *Furious* at the expense of an 18-inch gun previously mounted there. A narrow runway around either side of the smokestack and mast allowed the planes to be transported back and forth between the two flying decks. A similar vessel, the *Vindictive,* was completed in the autumn of the same year. The remodeled *Furious* carried out a highly successful raid in July, 1918. Accompanied by a squadron of light cruisers she steamed to within eighty miles of Tondern, the base of the Zeppelins which had been making night raids on London. Before daybreak a flight of seven landplanes took off with two 50-pound bombs each. The group made direct hits on the two large airship sheds and completely destroyed the *L-54* and *L-60.*

Had the war continued the new British carrier, *Argus,* would have contributed greatly to the success of the Grand Fleet in any engagement. It was the first of the clear-decked carriers and had a flying deck 68 feet in width and 500 feet in length. The possibility of eddy currents interfering with the pilot during a landing caused the designers to install horizontal smokestacks.

The first aircraft assigned to the remodeled *Furious* were mounted on skids not unlike skis. To enable these craft to take off from the bow, troughs with specially prepared sliding surfaces were laid fore and aft. When released the skids of the plane slid down these troughs until flying speed was attained. During the landing, the resistance was sufficient to stop the aircraft after only a short slide. To prepare for the case of a pilot who failed to touch his runners far enough aft, a series of 2-inch manilla lines were hung at 2-foot intervals from a boom extending across the entire breadth of the ship. The boom was placed at the forward end of the landing deck. If the plane over ran the deck, it was immediately enmeshed in the heavy lines and stopped with no injury to the pilot.

The method first suggested by Pegoud, the famous French aviator, in 1912, was also tried for landing a plane on board. From the machine a vertical hook was mounted. A long fore-and-aft cable was suspended at a height of about fifteen feet from the deck. The pilot endeavored to engage his hook on the cable, after which he cut his ignition switch and slid to a stop. This method proved to be far from positive and was never safe. Accordingly, it was discarded after a very short trial. Still another method was tried on board the *Argus.* Steel fore-and-aft cables were stretched the length of the landing deck. Placed about twelve inches apart they were suspended approximately twelve inches above the platform. Swinging downward from the axle of the plane were several steel hooks. As the machine settled on the deck in the process of landing, the hooks passed down through the suspended cables. The plane then ran on to a point where the deck took a distinct slope upward. As the landing gear rolled upward with the contour of the platform, the hooks engaged the fore-and-aft wires which maintained their original level. The plane then was attempting to roll up the incline while the cables were trying to keep it down on the original level of the deck. This resistance caused the craft to stop quite short. Unfortunately, the retarding force took place at the forward end of the plane and created a turning moment which nosed the machine up. The frequency with which this happened and the number of planes it wrecked caused this method to be abandoned.

At last the British went back to the system first used by the United States Navy in 1912, when Ely flew aboard the U.S.S. *Pennsylvania*. Steel cables were stretched athwartship and, from these, weights were suspended. Hooks were trailed astern by the planes and engaged in the wires. This method was satisfactory, but the task of clearing the arresting gear from the planes took considerable time. In the end, it was decided to leave the decks clear. Slow landing planes were assigned to this work. When the newer carriers with the long decks steamed full speed into the wind these aircraft were able to fly so slowly that they rolled only a short distance before stopping of their own accord.

It must not be thought that the Germans were remiss in the adoption of the airplane for naval uses. At the time of the Armistice they had four mother-ships for seaplanes. These ships often went out accompanied by mine sweepers to permit their planes to search for hidden mines. As a matter of fact, it was a German vessel which acted most successfully as a mother-ship during the war. From November, 1916, until February, 1918, Captain Neeger ravaged the seven seas with his raider, the *Wolf*. Aboard was a Friedrichshafen seaplane facetiously named the *Wolfchen*. Spare parts and replacements became exhausted from time to time and strange materials went into the machine to keep it in flying condition. The most difficult task was to keep a supply of proper fuel. The carburetor was designed to use benzol and upon the exhaustion of this fuel much trouble was experienced in keeping the engine operating. In all, fifty-six flights were made in the Pacific, Atlantic, and Indian oceans. Equipped with a load of bombs and message dropping tubes, the plane would take off to pursue a smudge of smoke on the distant horizon. Overtaking the vessel she would drop on board a message directing her to heave to, or to change her course towards the approaching mother-ship. In only one case did the captain of the overtaken vessel continue on his original course. After two bombs had been dropped close aboard he changed his mind and rang up "'Stop" on his engine telegraph.

The end of the World War found Great Britain far ahead in the development of the airplane carrier. The United States had devoted her aërial efforts to patrol work which was so essential to the anti-submarine campaign. However, our naval officers had seen the progress made abroad and they returned home eager to have this country participate in a similar development.

In 1919, Congress authorized the conversion of the collier *Jupiter* into an airplane carrier. However, up to 1921 planes continued to be flown from the turrets of our battleships and kite balloons were sent aloft from the quarter-decks in order to carry on aërial observations. As is well known, these methods were impractical when placed under the hard demands of the service.

The reconstruction work on the *Jupiter*, rechristened the *Langley*, was completed in 1922. With a flat deck 65 feet wide and 625 feet long, she was a queer looking contraption. Her resemblance to a prairie schooner was so striking that she soon became known throughout the service as "The Covered Wagon." Nor was this sobriquet inappropriate, for she was destined to blaze new air trails over the wide plains of the sea.

The *Langley* has proved to be a splendid training ship for pilots in the operation of a carrier. Her slow speed of 14 knots has always hindered her during maneuvers. For this reason, she had never been considered anything more than an experimental craft. Nevertheless, much experience and knowledge has been gained from the naval problems engaged in by this vessel. When the Washington conference in 1922 caused the abandonment of our naval building program the *Saratoga* and *Lexington* were saved from the scrap heap. Since the Navy desired more carriers it was decided to redesign these partially completed hulls for this new service. Their enormous horsepower, which gives these ships their high speed, renders them somewhat expensive to operate. Nevertheless, these huge vessels have become the backbone of our aërial armada.

With a tonnage of 55,000 still available for carriers, the performance of our new U.S.S. *Ranger* will be closely watched by all nations. Nor should we overlook the possibilities offered by the flying-deck cruiser. It must be remembered that the speed with which an air force can be launched depends upon the number of decks available. The airplane carrier has become an indispensable type of vessel to any fleet. With its brood of planes and its high speed it has the greatest potential strength of any fighting ship in the world.

PERSONNEL EFFICIENCY

By Lieutenant A. E. Becker, Jr., U. S. Navy

THE ultimate aim of every fighting organization is to win battles. Millions in dollars and thousands of hours of effort are devoted to preparing a modern fighting machine for any emergency which it might be called upon to handle. A smart fleet consists of "good ships, well manned." The era of good ships is reaching its ultimate perfection. Modern vessels are carefully planned and built to achieve a maximum fighting efficiency. The machinery of today approaches the theoretical limits for machinery efficiency. Considering this high order of development, together with current treaty restrictions, it becomes quite evident that the problem of personnel efficiency is gaining in importance. With equal fleets, the one that wins will certainly be the command which is the most thoroughly trained in the use of its highly specialized equipment.

The problem of training has ever been important, but today it is vital. It is not the usual way to consider training from a standpoint of efficiency in terms that we ordinarily use for machinery. A fleet is classed as efficient; just what is meant by this efficiency? Strictly speaking, efficiency is the relationship between output and input. For each ton of coal burned, a certain amount of energy is developed. The ratio between the energy developed and the energy used to develop it is termed as the coefficient of efficiency. We rarely hear of personnel problems being stated in numerical or exact measures of efficiency. Their measurement is more complicated.

Personnel efficiency is not the exact science used by engineers. The reason is self-evident. Human nature varies while a machine operates as it was designed by its makers. It is difficult to measure human capacities. Compare the problem of an engineer with the problem of the personnel officer. The engineer officer on a vessel desires a machine which will perform certain tasks. He requisitions it, stating in definite terms what type he wishes. When the requisition is filled, the machine has the exact characteristics which he desired. When the same engineer officer desires fifty firemen who will make excellent material for training as machinist's mates, watertenders, or blacksmiths, he may receive the men, but the problem of finding their capacity for training is far from solution. He discovers it by an expensive trial-and-error method.

Officers in the service are vitally interested in improving the efficiency of the service and, when they realize there are certain fields where much development is possible, they immediately turn toward the problem of applying these methods to increase efficiency. The science of psychology is devoted to this problem. The modern phase of this science known as industrial psychology has developed by leaps and bounds from a vague and purely experimental stage until today we have a definite and useful method for increasing personnel efficiency. The principles of industrial psychology are applicable to the personnel of the Navy from the very day they present themselves at a recruiting station until the day they are stricken from the retired list. Psychology has made a scientific study of the problem of handling men, training men, and the proper methods for selecting men for the work they are best fitted to do.

To illustrate some of the practical applications of this science, consider a new division officer who has just taken over a turret division on one of our modern dreadnoughts. Under his charge are 80 to 100 men and a vast quantity of complicated machinery to be operated. The first problem is properly to assign each subordinate to a certain task in the manipulation and care of his complex turret machinery. Hours of diligent and strenuous training will be devoted toward training the division to operate the turret at its maximum efficiency. With the given number of hours for training, how efficient will the turret crew be? Who should be the pointers and trainers? Who should be the gun captain? Who

should fill other important positions in the turret? These are questions that must be answered. It is a well-known and established principle that the proper placing of the men is vital at the start of the training period. How is this done today in the fleet? It is accomplished by the time-honored method of trial and error. With the principles of modern psychology to serve as a guide and aided by psychological tests, the turret officer should be much better qualified properly to place his men and gain the most from the time devoted to the training.

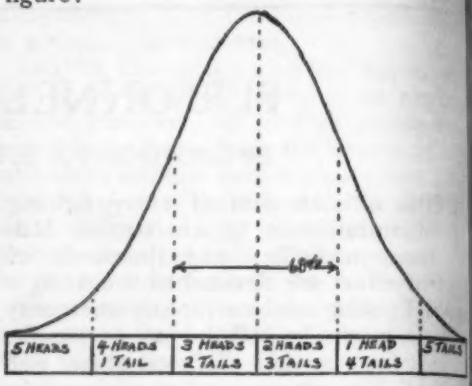
When the problem of selection is solved, the next task is the proper training of the turret crew. Here again the ultimate efficiency of the turret operation can be increased by the application of sound scientific methods of training.

This example sounds most interesting and one is prompted to believe that it is a splendid idea. How can these things be accomplished? The Navy has already started its work in scientific selection and training of its personnel. At all the training stations a substantial number of young recruits are selected for training in the numerous class A service schools, by scientific methods rather than by mere chance.

A concrete example of how men are selected for the machinist's mates school at Hampton Roads will serve to illustrate the methods. To understand selection, consider yourself confronted by 100 young, eager recruits who desire further training. From the 100 men you are to select 4 for training at the machinist's mates school. How would you pick the best 4 men?

The first and natural impulse would be to exercise your natural confidence and draw upon your own judgment to select the right men. Your candidates would very probably be more than fifty-fifty choices. During the last three years this method was in general use for selecting men and the actual records at the school show that 57 per cent of the men graduated while 43 per cent failed. This is not a very high ratio of efficiency.

Statisticians have established a fundamental rule of natural distribution. Take a number of coins, say five, and throw the coins upon a table, keeping a record of the number of heads and tails in each throw. At the end of a large number of throws, say a thousand or more, plot a curve from the records and it will resemble the following figure:



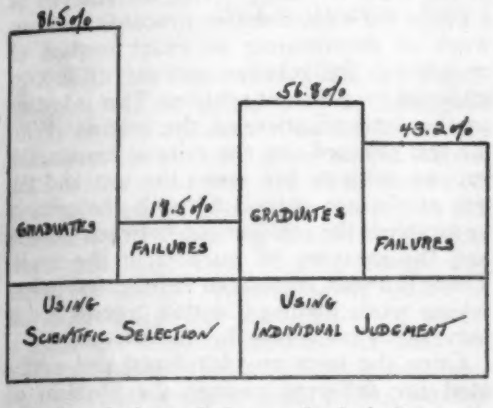
Notice the very few cases all heads or all tails. Most of the cases distribute in the section where the combination of heads and tails prevails. Instead of plotting throws of a coin, plot the average height of 1,000 men picked at random, or plot the average weight of a large number of men, or again plot the size of the shoes worn by a large group. You will find the curve resembles the coin throwing one to a very marked degree. Scientists find that human traits or talents follow this same distribution.

Mathematicians have named this curve the probability curve, because from it can be found the chances of a man being a certain height, wearing a certain size of shoes, possessing a certain amount of intelligence, or of getting all heads when a number of coins are thrown. The interesting feature is that 68 times out of 100 a man will fall in the normal part of the distribution. Mathematically speaking it is possible to select an average man 68 times out of 100 by pure chance. Added to the average are the 16 chances in 100 of selecting a man better than average. Combining the average and the better than average the chances are about 84 in 100 of picking average or better than average material for the school. This accounts for much of the success gained by chance selection.

The Navy's service schools of today, however, are very difficult and the candidate must be more than an average man successfully to complete the course. There is need for a definite procedure and an accurate way of measuring a man's ability.

With this aim in view, a scientific study of the school at Hampton Roads was conducted and more positive methods of selection were

placed in effect. The following curve shows the increase in graduates and the decrease in failures since using scientific selection as compared to selection depending solely on individual judgment:



A description of the methods is interesting. At present all recruits are given the O'Rourke General Classification Test, the O'Rourke Mechanical Aptitude Test, and a standard test in arithmetic, spelling, English, and handwriting. The results of these tests are entered in the service record on pages 4a-4b. These test marks are purported to measure certain inherent abilities or scholastic attainments, but it is necessary to establish definitely what each test mark contributes to forecasting success in the work under consideration.

Scientists use a definite measure to compare test results with actual achievement. This is known as the coefficient of correlation. It requires certain explanations. Consider 25 men who have taken a certain test. They are given standings from 1 to 25 in accordance with their test marks. These same 25 men are sent to a school and complete the course. Arrange them in the order of their merit at graduation. The man who stood 1 in the test stood 1 in the class; the man who stood 25 in the test stood 25 in the class; the man who stood 10 in the test stood 10 in his class; and so on for the entire class. The test forecast exactly the standing in the school. This is a case of perfect correspondence and the correlation would be expressed by the figure plus 1.00. Consider the opposite case where the men stood in a completely reversed order to their order on the tests; that is, number 1 on the test stood 25 in the class; number 2 in the test stood 24 in the class; and so on. There is a perfect correspondence between them but the correspondence is completely negative. In this case the correlation would be minus 1.00. Should there be no correspondence whatsoever, either positive or negative, between the test marks and the class marks, there is said to be a zero correlation which is expressed as .00. The varying degree of correspondence, either positive or negative, is measured by a correlation coefficient between .00 and plus or minus 1.00. For example, a study of the hospital corps school final marks and the general classification test marks showed a correlation of plus .62. Most good tests correlate between 60 and 80.

At the machinist's mates school a thorough study of the relationship between the general classification test, the mechanical aptitude test, the arithmetic test, and the final marks at the school was conducted. The correlations between the final marks and the tests were as follows: general classification test and final mark, plus .235; mechanical aptitude test and final mark, plus .412; and the arithmetic test and final mark, plus .221. Combining these marks by the use of the multiple regression equation, a total correlation of .46 was obtained. Using the correlations again, the relative value of each test was computed, establishing a weight of 1 for the general classification test, a weight of 5 for the mechanical aptitude test, and a weight of 2 for the arithmetic test. The correlations require a considerable amount of technical and mathematical work but the results are simple and their application practical to use.

The next step is how to apply these weighted test marks in selecting men for the school. There are other considerations to notice besides the test marks. First, a man's personal interest must be considered. It is a well-known and established principle that any man works better at the job in which he is interested. This is a factor that cannot be disregarded. Take the original 100 men who were possible candidates for the machinist's mates school and out of this group probably not more than about 25 would be interested in becoming machinist's mates.

Another, and most important item, is the petty officer possibilities of each man. Here is a difficult problem to solve. The platoon commander knows a great deal about the men. The problem is to get from him what

he knows about the men. By merely asking an opinion regarding a man or assigning an aptitude mark results in nothing more than general confusion. Something more definite and explicit must be used. The navy standard fitness report form offers an example of a more exact and uniform method for personnel marking. A similar form was developed at the training station for the use of platoon commanders in reporting on the fitness of their men. This form provides a useful instrument for singling out the excellent men and disregarding the poor ones.

Equipped with this information, it is possible to take the 25 remaining candidates and eliminate the undesirables. Say this leaves 10 candidates. The final step is to compute the multiple test mark, using the proper weightings for each test, and select the highest 4 men for the school.

The method appears to be rather involved and a question concerning its cost is quite natural. When the experimental work has been completed, the actual administration of the tests is very simple and the cost negligible when compared to the greatly increased school or training efficiency.

A method similar to the one described can be used profitably for every rating in the service. The sole problem rests in developing the proper tests for measuring the peculiar ability necessary for success in the different ratings. Notice the small correlation between the general classification test and the machinist's mates school marks. Compare this with the high correlation between the general classification test and the hospital corps school marks. It emphasizes the importance of determining the value of every test for the purpose for which you wish to use it.

There are many varieties of tests on the market today. Some are pencil-and-paper tests, some are strength tests, some are school achievement tests, and others are miniature occupation tests. Before any of them can actually be put to practical use, it is necessary to determine what trait or capacity they measure. This is usually done by the process of shrewd guessing. The next problem is to determine what aptitudes are involved in the various processes that a man goes through in carrying out the details of his work. This is done by a careful analysis of the trade or rating. With the analysis as a guide the experimenter proceeds with the work of determining an exact method of comparing the relative amount of success achieved by different subjects. This is known as the determination of the criteria. With the test selected and the criteria known, the various subjects are given the test and the test marks are correlated with the criteria to establish the relationship between the test and the measure of success in the trade. There is a vast amount of careful and painstaking work involved in this process and it is certainly not a task for the amateur.

Once the tests are developed and evaluated for different ratings the problem of administering them and interpreting the results is simple and of great practical value to every person concerned with the placing of men for training.

By the use of scientific methods of selection a vast field is opened for increasing personnel efficiency. It is needless to say that the labor and study involved is offset by the increased training efficiency. Considered from the standpoint of preparation for possible wars, selection is vital. During the early days of any hostilities, large numbers of men must necessarily be drafted into the service during a very short span of time. To place the draftees where they will produce to a maximum is a problem which must be worked out during peace-time periods when the proper time and study can be devoted to them. If war is declared, it is too late for careful experimenting. If the tests are ready, the problem of training and assignments will be in a healthy state of preparedness and will speed up the entire training period.

The practical usages of industrial psychology may be profitably employed by the Navy in its ever ceaseless striving towards the goal of a fleet composed of "good ships, well manned."

★

TO FIGHT *the enemy is nothing—we must beat him. We must mean to win.—Baudry.*

TYPHOONS AND SYCEE

By Commander Roy C. Smith, Jr., U. S. Navy

IN EARLY September, 1925, the U.S.S. *Noa* was on patrol duty at Shanghai. It is not customary at home to use destroyers for such duty, but on the Asiatic Station they must perforce be so employed. We had been in Shanghai, moored to the Standard Oil docks on the Pootung side, since mid-July. Our landing force was ashore across the Whangpoo on guard at the municipal power plant. This was shortly after the famous "incident" of May 30, 1925, on Nanking Road, Shanghai, and feeling was running rather high, strikes waxing and waning weekly. Naval guards were ashore from the international fleets present and the Shanghai Volunteer Corps was on active duty. In other words, Shanghai was in a state of normalcy.

Coming down from Chefoo early in July, we had run into the tail of a particularly nasty typhoon and had had our bridge smashed wide open by seas. Those of the crew who were not ashore with the landing force were busily engaged rebuilding the bridge, which was completed about the end of August, and we were ready to go to sea again. About this time the situation ashore eased a bit, our landing force being withdrawn and replaced by marines from the *Abarenda,* so that as I started ashore on the afternoon of the second of September, I felt that I again commanded a ship ready for any duty.

On the way home, as on other days, I stopped off at the American Club, in Foochow Road. In the lobby I was accosted by the admiral.

"Just the man I wanted to see. Can you be ready to sail at daybreak tomorrow?" I allowed as how I probably could, and was told what for. I proceeded to man a telephone booth, where I remained a large part of the afternoon, the Shanghai telephone service being even worse than most, and complicated by the fact that the operators are Chinese and know very little English. However, I got through to the Socony installation and after awhile got *Noa's* officer-of-the deck. I started him getting ready and rounding up officers, liberty crew, and patrol ashore, and then called my own particular c. in c. She was quite annoyed, as we had a large dinner date that evening. However, we got all hands collected and were able to get away on time in the morning—after routing my son out of his hiding place in the flag bags on the bridge and putting him ashore in care of the installation manager. As we stood down the river we started getting machine guns and ammunition ready, and carefully scrutinized charts and the latest typhoon warnings.

The SS. *Fei Ching,* a small coasting steamer belonging to the China Merchants Steam Navigation Company, was proceeding on one of her leisurely voyages. She had left Ningpo bound for Foochow, and was proceeding past the Chusan Archipelago when a typhoon signal caused her hastily to put in for secure anchorage under the Kueshan Islands. She had a large number of Chinese passengers and a mixed freight. In the freight was included a shipment of about five tons of silver, bullion, and sycee. A sycee is a lump of silver shaped somewhat like a coal scuttle with a double lip. They are of different sizes, being made of a value of a certain number of taels. The ones carried in this case were about the 100-tael size. This silver was largely owned by American banks and had been insured by the American Asiatic Underwriters.

The ship rode out the storm and was about to proceed on her voyage when a serious leak was discovered in the engine-room. A Kingston valve casting had pulled away from the ship's side. The captain hastily beached the ship to prevent her sinking. All the earmarks of a Chinese piratical adventure were present.

The *Fei Ching* carried no wireless, and could not communicate with her owners. After a day or so a small fishing junk carried news of her plight to the mainland, and things began to get hot. Swarms of fishing junks (which are pirate junks when there is

any pirating worth doing) appeared and prepared to loot the ship. The first attack was repulsed with fire hose and slice bars. But the two white officers knew these were but holding attacks, and that the real test would come later when enough pirates had arrived.

Meanwhile, however, the fisherman who carried the first word ashore had been perhaps too talkative. At any rate, the news came to the ears of the Chinese River and Coastal Police, a purely Chinese organization which is really not so dusty. The local Tao Yin sent out a small armed junk with a dozen soldiers of this outfit, and also several larger junks to take off the passengers.

These arrived just in time. The larger swarm of pirates had collected, and with much beating of gongs and firing of fire crackers was advancing to the attack, when the coast guard arrived. She fired a few volleys at the pirates, who incontinently vanished and became peaceful fishermen again. The junks went alongside the steamer and took off all the passengers, and set sail for the mainland. The police junk remained standing by, some of the soldiers going aboard the *Fei Ching,* where they were of much assistance in various ways.

When the passengers got ashore, one, who had been intrusted to do so, sent a message to the shipowners, the first news they had of the affair. This was about a week after the ship had been beached. The American bank was notified and they at once asked the admiral, the commander, Yangtze Patrol Force, then senior officer present, for assistance. Accordingly, the admiral sent us down.

We proceeded, as nearly as I can recollect, on a Wednesday morning, with another typhoon signaled on its way up the coast. Meanwhile, the steamer's owners had sent down a sister-ship with what they fondly imagined was a wrecking outfit, a gasoline pump which could not work, and no gasoline. Also, still no radio.

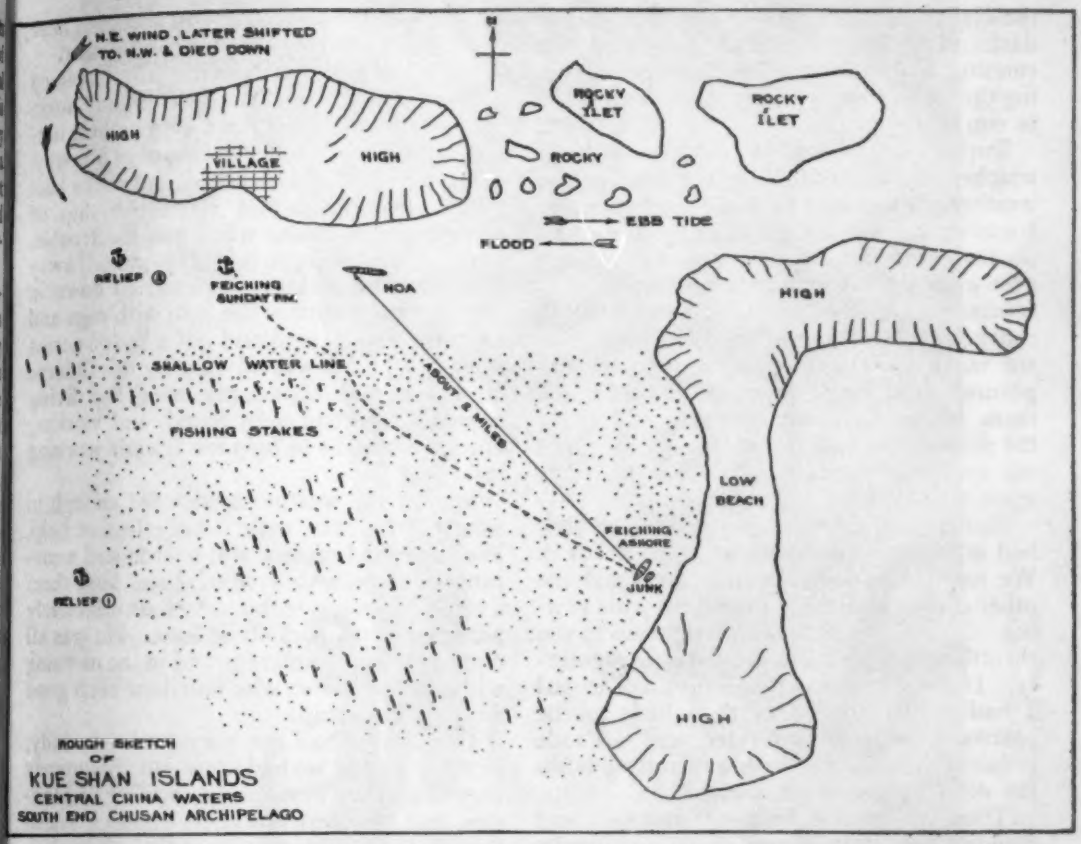
The trip down was made in good weather and at 27 knots speed. On the way the boats were equipped, and an armed boat's crew made ready to go to the stranded ship immediately on anchoring. Everything was prepared in case we had to fight off pirates, as the latest information we had was that pirates had attacked the ship, and might still be about. Our crew were all eagerness and "rarin' to go." On the bridge the executive and myself examined closely such charts as we had of this locality. These were of very little help, being merely the general coastwise charts, no large-scale chart of this locality existing. However, we picked a way down, and selected what promised to be a satisfactory anchorage. Just before we got in, the wind picked up from the northeast and we began to worry actively about the typhoon.

We got in about 2:00 P.M., dodged a series of fishing stakes, thick bamboo poles planted in the water, rounded a high rocky island, the northernmost of the Kueshan group, and came to anchor in its lee. The boat was lowered and manned, and with an officer in command it set off over the rough sea to where the *Fei Ching* lay beached about two miles away to southeastward. We could get no nearer due to shallow water.

From the ship we could see waves breaking over the stern of the stranded ship, and what appeared to be smoke coming from her after well deck. There was a small junk near her, and well off to the southwest was lying the relief ship of the same company—apparently doing nothing. To our great disappointment, there were no pirates anywhere to be seen. As we learned later, they had been driven off by the armed coast guard junk. This was the craft we saw near the *Fei Ching,* flying the distinctive flag of the river police, a red flag with the white sun in a blue field in the uppermost corner and five wavy white horizontal stripes in the red. The general situation will be seen from the accompanying sketch chart.

The boat proceeded on its way, and after a while reached the stranded ship. There the boat officer, Lieutenant (J.G.) D. F. Smith, U. S. Navy, found that there was no immediate danger, unless the typhoon should break suddenly. The master complained bitterly that he had a gasoline salvage pump but that it wouldn't work, and he had only about a gallon of gasoline anyway. The company hadn't thought to send any down with the pump. What we thought was smoke from the hold was merely from Chinese cooking pots. There was no fire aboard. The silver was safe, but was in a hold that was partially flooded. We thought at first we would have to dive for it.

The boat returned with its news, and we prepared to lend assistance. First we sent the boat across another two miles of sea off



to the stand-by ship to see if they had brought any diving gear. They thought they had, but couldn't find it, though a helmet turned up later aboard the *Fei Ching*. Anyway, we didn't need it in the end. We broke out a drum of gasoline, and had a couple of machinists ready to go over to fix the pump. These we sent over when the boat returned, and I went along to arrange for the silver transfer.

The deck of the *Fei Ching* presented a scene of remarkable disarray. Various gear and cargo were adrift all over the place, with water washing about in the wells. The upper midship deck was the only comparatively dry place on deck, and that was thick with coal dust, why I don't know. The pump was below in a passage near the engine-room door and our lads started in to fix it up. Fortunately, the wind now shifted and the seas calmed a bit, so that not so much water came aboard. After arranging to send men over in the morning to begin on the silver, I left the two machinists and went back to the *Noa*, it being now nearly dark. When I had left the master let the armed junk go, but kept a few soldiers as a guard. They were a fine working party, too, turning to with a will wherever needed.

The morning was clear, but with a good wind and sea running. The typhoon was nearer; we had followed the reports—and it looked as though this would be our only chance to get in much work before it hit us. We sent a working party over early in the morning, and started ferrying the silver across. The men had to work up to their waists in water, and sometimes even deeper, but they kept at it with a will. The master gave them some beer for lunch, which helped, but unfortunately (perhaps) when the officer in charge returned to the ship later to report, he also gave them some whiskey. The result was—not so good. Still the work went forward, and for a wonder the motor boat, which generally was cranky, did her stuff to the queen's taste. It took about eight trips, lasting all day, to get all the silver over,

the last trip returning with the men just at dark. The machinists had got the pump running, and it was helping greatly in freeing the ship of water. They remained aboard to run it.

During the afternoon I had anxiously watched and waited, pacing the deck, as the weather got worse and worse. Several times I was on the point of ceasing operations, but the boat seemed to ride the seas well enough even when loaded, and the men in it begged to continue. On the last trip, the officer in charge got the master of the *Fei Ching* to issue out a good stiff ration against the exposure, which fixed them all up and made them forget their day's wetting. Two of the men in the working party, however, got too well fixed up, and had to be attended to upon their return.

Shortly after dark the weather got very bad indeed, and we knew we were in for it. We had 90 fathoms on one chain and the other anchor underfoot to prevent wide yawing. Steam was maintained right up to the throttle, and the engines turned over regularly. If we dragged, we had no place to go! I had earlier shifted berth a little to the eastward to get a better lee, and we rode it fairly well except for heavy rolling when the wind and tide were opposed.

Thus we lay all Friday, Saturday, and Sunday, while the storm raged and finally spent itself. We later learned that this was one of the worst typhoons in years, doing much damage all along the China coast and particularly to shipping at Woosung and Shanghai. The admiral apparently worried about us, but our radio kept him informed of our condition, so he could know we were holding on. We could not communicate with the *Fei Ching,* but could see her during daylight, and her lights at night, so hoped she was all right, even though waves did break pretty well over her all the time. During Friday night the relief ship, not liking her exposed position, came in and anchored near us. So we lay until the storm blew over.

On Sunday afternoon the worst seemed to have passed, and later, much to our interest, we perceived the *Fei Ching* getting herself off the beach and standing over our way. She came close and anchored, and sent a boat over. The pump had freed the ship of enough water to see what was the trouble. Finding the Kingston valve pulled away from the ship's skin, they crawled down in the water and stuffed the hole with rags and anything else to hold and got a board across somehow. This was all done by the Chinese crew, one man apparently using the diving helmet which had been found, and working from the outside to help his friends working inside.

Shortly the weather moderated enough to send a boat over with some effective help. We furnished cement and boards and a carpenter's mate, who went over and built them a cement box inside the hole, thus effectively plugging it, temporarily at least. He was all night at this job, and returned in the morning with our machinist, who had done such good work on the pump.

Our chains had got very foul, naturally, in the swinging we had done, but fortunately they came clear in the early morning of Monday, and the alert officer-of-the-deck seized this chance to get up the underfoot anchor, also heaving in on the other chain. As the weather had now very much moderated, we could ride safely to a shorter scope on one anchor. About six we sent over and got our people back from the *Fei Ching* and made sure that she was all right and could make port under her own steam. This they thought she could do, under convoy of her sister. About eight, then, we got underway for Shanghai, and stood out over a sea now smooth and blue, with a promise of a pleasant trip in. The promise, however, was not fulfilled. But that is another story.

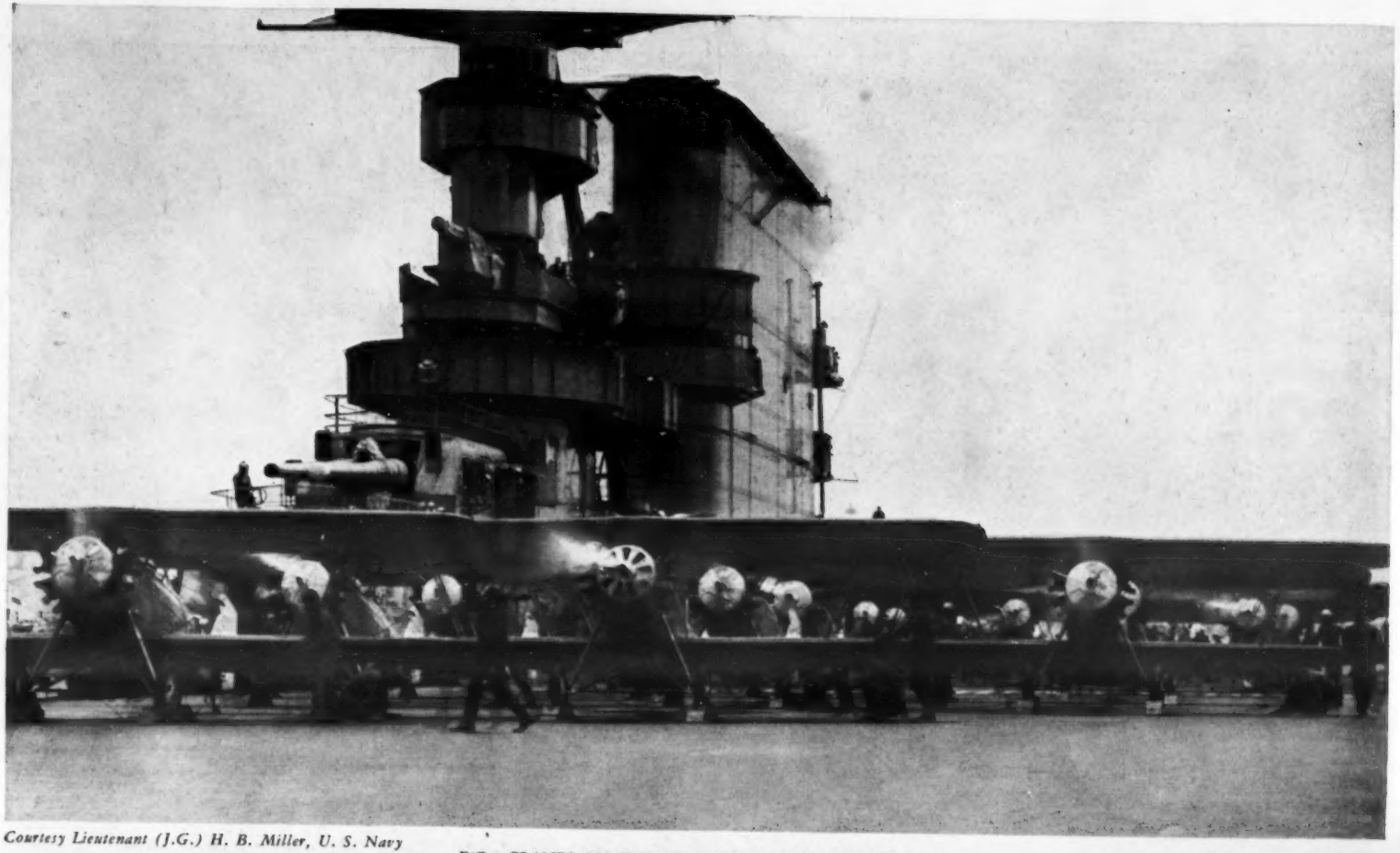
★

SOMETIMES, *but not often, a powerful mind is coupled with a very strong backbone. Such a man, when he has a chance does great things.*—WILKINSON.

From a photograph—
Naval and Military Record

Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

THE FLYING-OFF RUNWAY ON A TURRET USED BY THE BRITISH DURING THE LATTER PART OF THE WAR (See page 1466.)

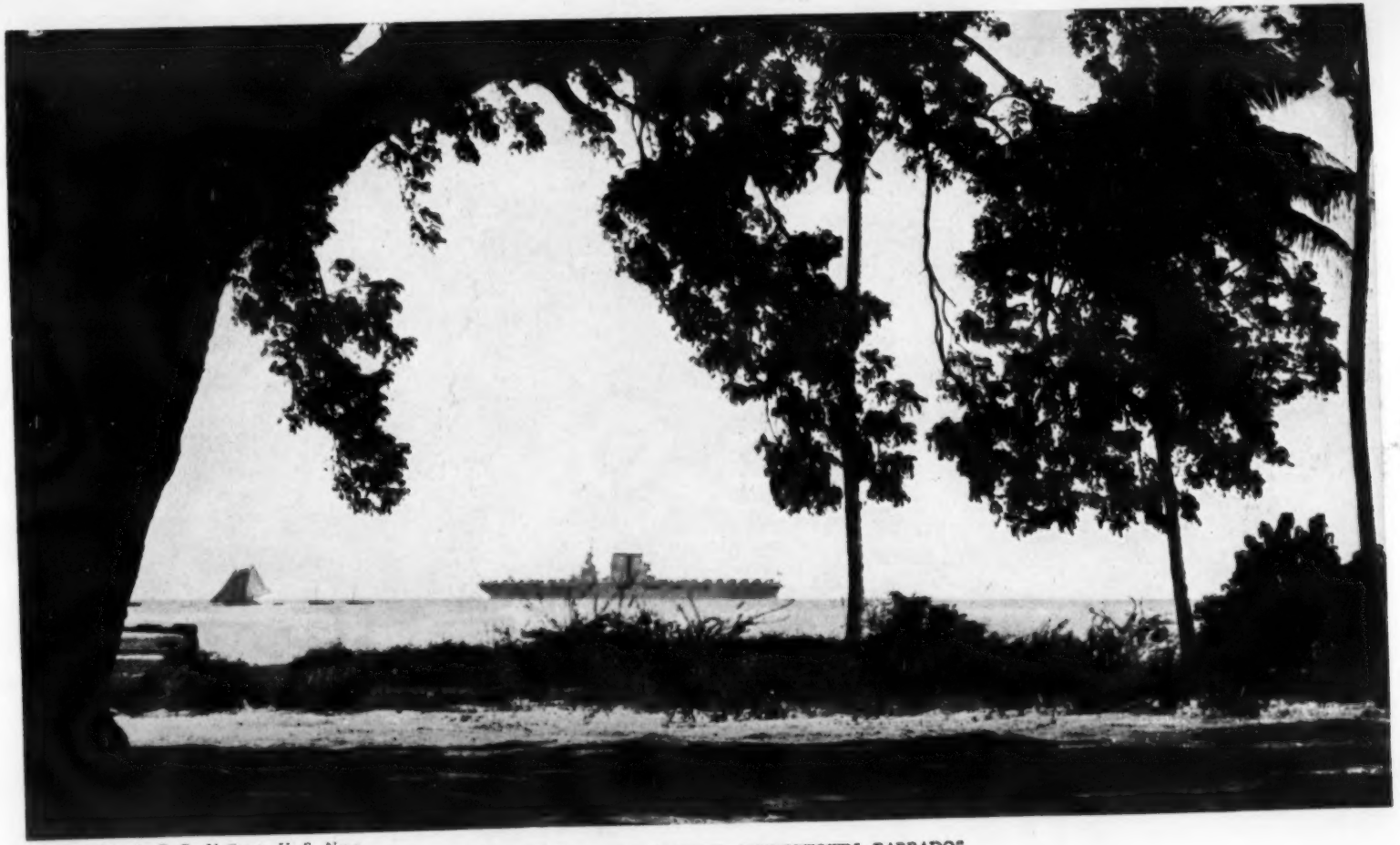


Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

F2B-1 PLANES ON FLIGHT DECK READY TO TAKE OFF

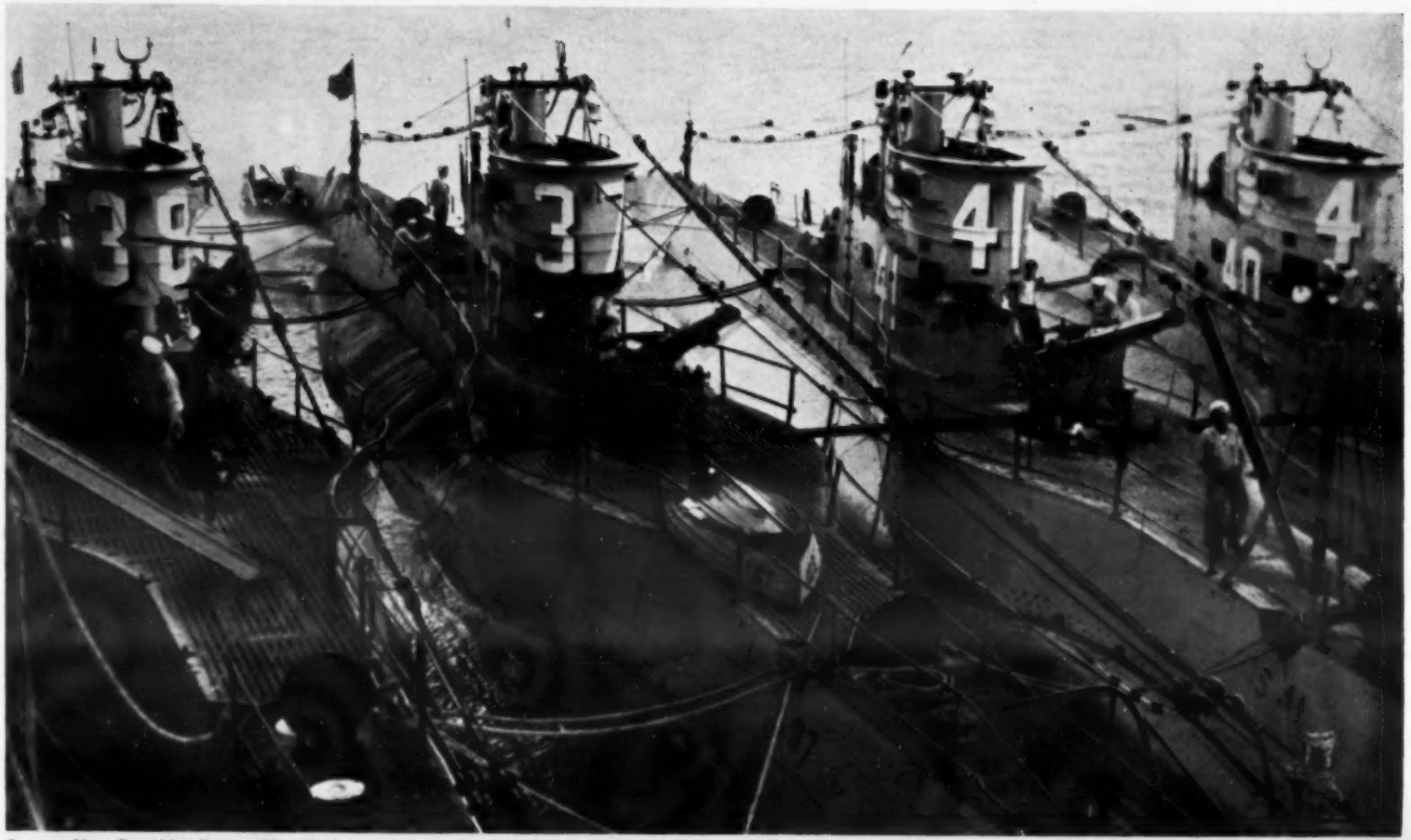
Courtesy Lieutenant (J.G.) H. B. Miller, U. S. Navy

F2B-1 PLANES ON FLIGHT DECK READY TO TAKE OFF



Courtesy Captain F. R. McCrary, U. S. Navy

U.S.S. *SARATOGA* AT ANCHOR, BRIDGETOWN, BARBADOS



Courtesy Navy Recruiting Bureau, New York

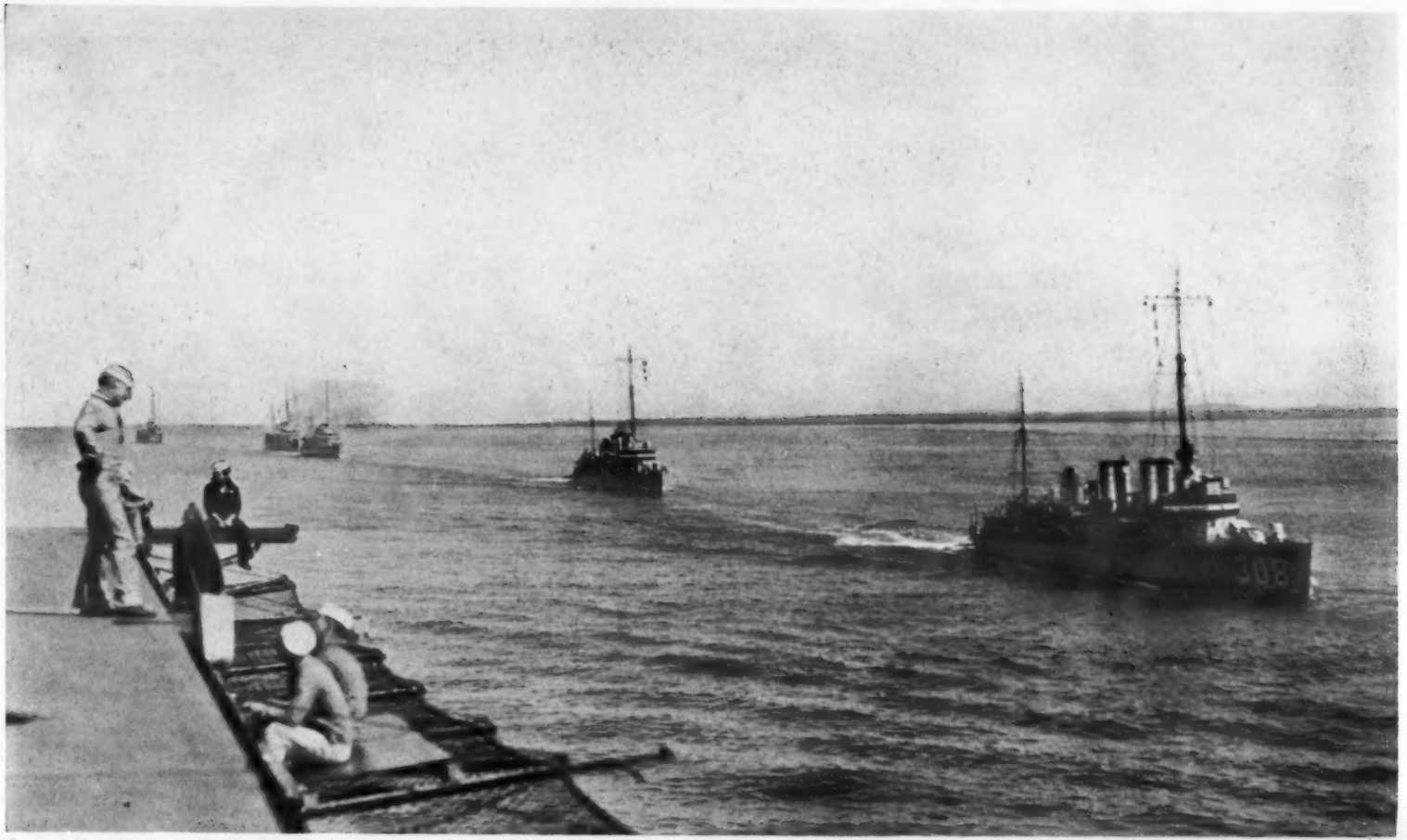
SUBMARINES OFF TSINGTAO

Courtesy Navy Recruiting Bureau, New York

SUBMARINES OFF TSINGTAO

Courtesy Navy Recruiting Bureau, New York

DESTROYERS OFF HAITI

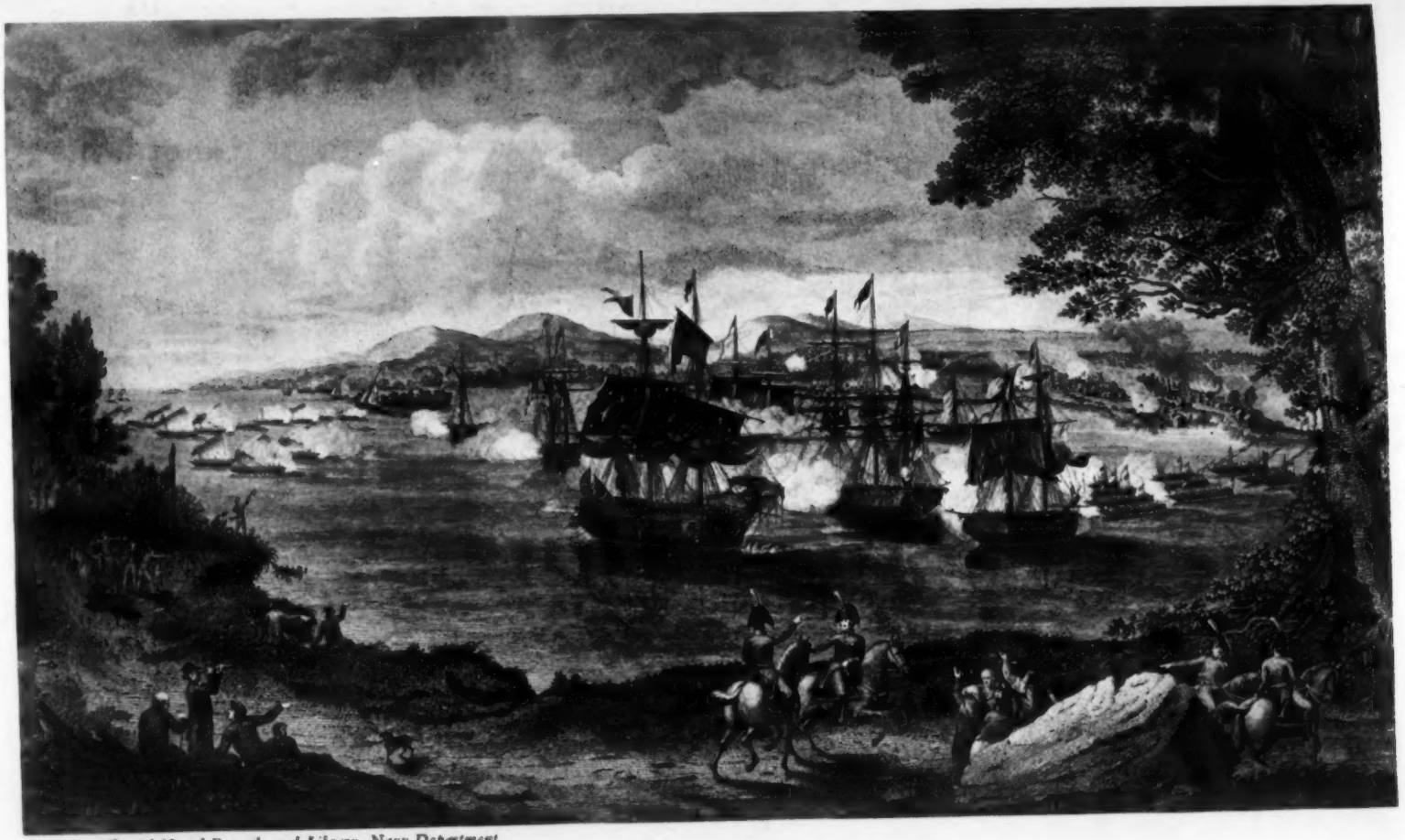


Courtesy Navy Recruiting Bureau, New York

DESTROYERS STEAMING IN COLUMN FORMATION

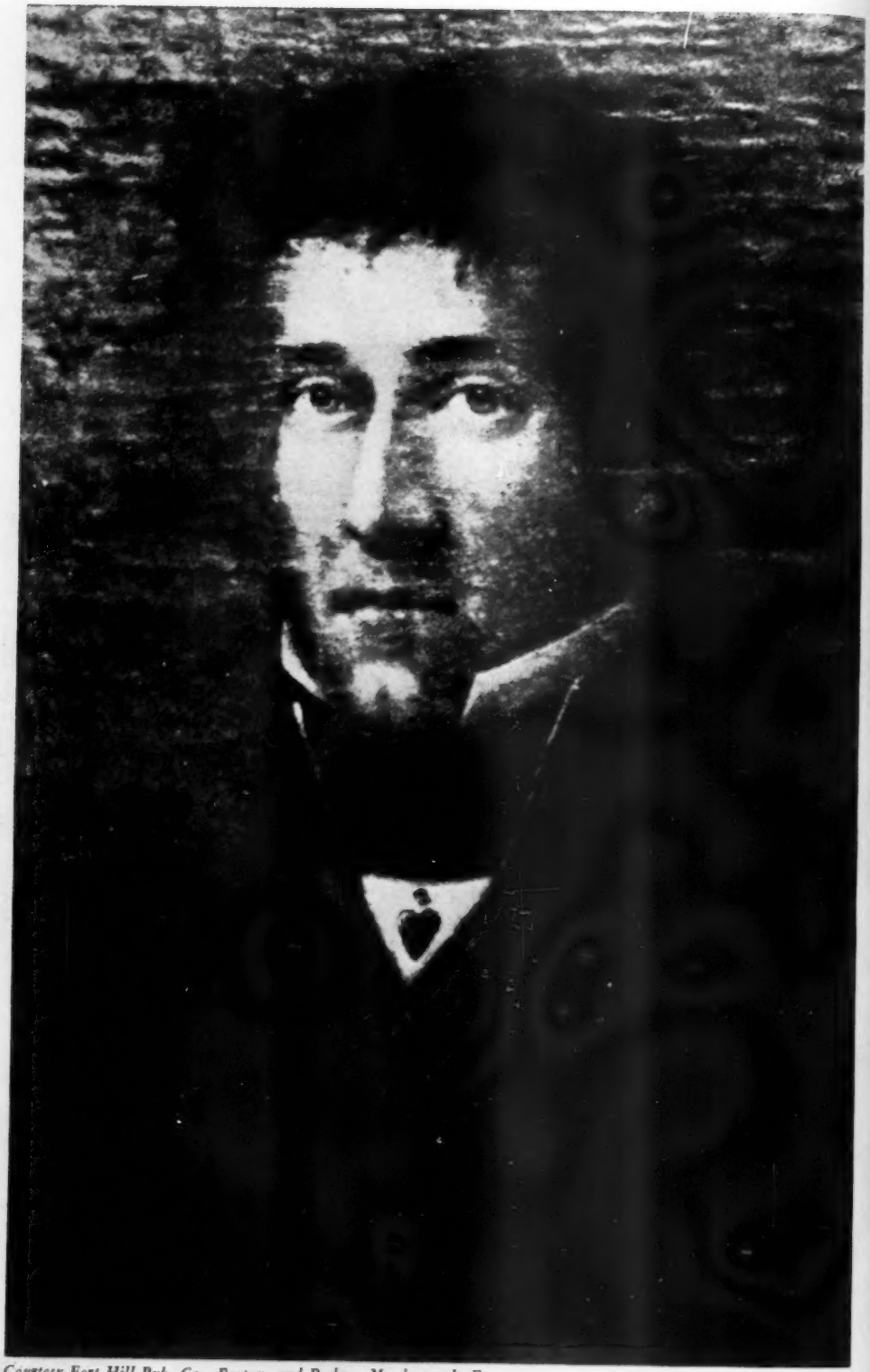
Courtesy Navy Recruiting Bureau, New York

DESTROYERS STEAMING IN COLUMN FORMATION



Courtesy Office of Naval Records and Library, Navy Department

MACDONOUGH'S VICTORY ON LAKE CHAMPLAIN



Courtesy Fort Hill Pub. Co., Boston, and Rodney Macdonough, Esq.

MACDONOUGH WHEN ABOUT TWENTY-TWO YEARS OF AGE
(From a portrait supposed to have been painted in Italy)
By permission of the Historical Society of Delaware

A FORGOTTEN COMMODORE—THOMAS MACDONOUGH

By Rear Admiral Livingston Hunt (S.C.), U. S. Navy (Retired)

MACDONOUGH was a simple, unpretentious man, modest and self-effacing, and it may be for these reasons that he has never come into his own with the American people. "Who was Macdonough?" will be asked by most middle-aged persons who will remember that his name was once somewhere in their school histories, but who now carry with them that dim and confused mental panorama of their country's naval history which is the possession of most people who have been through college and then have gone into business. They may know the names of Paul Jones, Decatur, and Perry; but Macdonough's picture has faded out, and so has the part that he played. Yet his actual features are not lost; for they were painted by Gilbert Stuart and J. W. Jarvis, and by an Italian artist in Italy. He was light-haired and blue-eyed, tall and thin, with a narrow face and sharp nose. We are told that he had an expressive but remarkably placid countenance. He sailed many seas, fought hand-to-hand fights for you and me, was Stephen Decatur's favorite midshipman and helped him destroy the American warship *Philadelphia* when in the hands of the enemy—did all these things when under twenty-one, and his young renown flamed into a final burst of glory in a battle on Lake Champlain, which he conducted himself when he was only thirty years old; after which he was caught in the grip of tuberculosis and slowly succumbed to it, dying at the age of forty-two.

His right and title to our interest and our gratitude is that he prevented the absorption of the upper half of New York state, and probably of the lower half too, into the Dominion of Canada. He accomplished this by the capture of a British fleet of four vessels on September 11, 1814. To the average person, the most striking characteristic of Macdonough, next to his youthfulness, is his religious temperament. Indeed, in the matter of youth, he had already been surpassed by Oliver Perry, who the year before had taken a British fleet of six vessels on Lake Erie, when he was only twenty-eight years old. Macdonough was a member of the Episcopal Church, becoming a communicant of it after his first busy years afloat had been followed by a period of inactivity, during which he had prepared himself for the privilege of sharing in the sacrament of the Lord's Supper. His interest in his church was shown, among many ways, by his intimate knowledge of the Bible, with an especial predilection for the Epistle of James. He made a hobby of this Epistle which, he said, was written for men who followed the sea. On the Sunday before the fight in Plattsburg Bay on Lake Champlain, he quoted to a friend who had come on board the *Saratoga*, his flagship, the following expressions from James: "He that wavereth is like a wave of the sea driven with the wind;" and, "Behold the ships, which though they be so great and are driven of fierce winds, yet are they turned about with a very small helm." This seems to us today a strange sort of conversation for a young naval officer.

The matter of public prayer before battle on a man-of-war does not nowadays come within the range of probabilities, but in those days it was provided for even if not often practiced. This is shown by the prayer book of the Episcopal church which contained then, as it does now, a "Prayer to be said before a fight at sea against an enemy." "In the British Navy," says Masefield, when describing sea life in Nelson's time, "in some ships even as late as the battle of the Nile it was the custom for the ship's company to muster to prayers before going to battle." I find no instance of the recital of prayer on the quarter-deck of any of our ships-of-war until the youthful Macdonough made use of it on the day of his great battle in 1814. Private prayer, as op-

posed to public, before a battle at sea, has of course been often turned to by naval commanders both then and now.

It would be an interesting search, and one of enrichment to the searcher, to trace through our early naval annals the evidences of religious feeling shown by our commodores of those times. It is certain that in the days of sails, when craft were frail and the crossing of an ocean took weeks and months, there existed a craving among sailors to consign their safety to the hands of an Almighty. Coming down to more recent times, how many people are aware that the late Admiral Mahan was the author of one of the most spiritual and devout treatises on personal religion, which he called *The Harvest Within?* And, also, how many naval officers today remember that at noon on April 26, 1862, Farragut ordered all the officers and crews of his big fleet to return thanks to God for their safe passage past the forts of the Mississippi?

We can be certain that the religious faith of young Macdonough brought him (like Nelson before the battle of Trafalgar) upon his knees before he emerged from the privacy of his cabin on the day of his fight with the British fleet. There is no record of this, however; but there is a record of the following unusual occurrence; about nine o'clock of the morning of that day Macdonough mustered his dozen officers on the quarter-deck of the *Saratoga* and he and they all got down upon their knees while he repeated the regular prayer of the church from the Episcopal prayer book, ending in these words:

> Stir up thy strength, O Lord, and come and help us; for thou givest not alway the battle to the strong, but canst save by many or by few. O let not our sins now cry against us for vengeance; but hear us thy poor servants, begging mercy and imploring thy help, and that thou wouldst be a defence unto us against the face of the enemy. Make it appear that thou art our Saviour and mighty Deliverer, through Jesus Christ our Lord. Amen.

It was, of course, in strict accord with the temper of Macdonough's mind that, after two and a half hours of fighting, ending in the capture of four British ships and twelve gunboats, he should send the following dispatch to the Secretary of the Navy:

> Sir; The Almighty has been pleased to grant us a signal victory on Lake Champlain in the capture of one frigate, one brig, and two sloops of war of the enemy.

With prayer to God before, and thanks to God after, a bloody battle, we can easily believe that Macdonough's religion made him aim his guns, as he did on that day with his own hand, with a surer aim than that of the ordinary Christian.

To the naval critic there is something more conspicuous in Macdonough's career than either his youth or his religion, and that is his professional ability. In the term "ability" I include the quality of personal courage. Macdonough anchored his fleet of four vessels in a line bearing north and south across the mouth of Plattsburg Bay, and there waited for the British fleet to advance and attack him. That his method of compelling the form of attack, and his subsequent conduct of the ensuing engagement were of a very high order of tactical ability can be ascertained by reading the clear and able narratives of the battle given by such diverse writers as Cooper, Roosevelt, Admiral Mahan, and Henry Adams. To the last author, the general reader, as well as the naval officer, is especially recommended. These historians agree that Macdonough had a force inferior to his enemy's, and that he, though only with great difficulty, won a victory solely by reason of superior skill and judgment backed by an obstinate quality of courage that never flagged. Twice was he knocked down on his decks, yet in the last quarter of a very bloody battle he executed the clever and difficult maneuver of turning his ship about and presenting a new battery to his enemy, thereby changing what had been sure to be his own defeat into his own complete victory. It is no ordinary picture in our naval history that was presented that day to the eyes of posterity, when four defeated British commanders came together in a small boat alongside the United States ship *Saratoga* to announce their formal surrender. After climbing on deck, they took their caps in their left hands, and holding their unsheathed swords by the blades in their right hands, the handles towards Macdonough, advanced with bows, and offered their swords to the smoke-stained young officer before them. "Gentlemen," said Macdonough, "return your swords into your scabbards and wear them. You are worthy of them." We are told by William James, the English naval historian, whose rancor against America and Macdonough rarely

permits him to tell the whole truth, that at this moment Macdonough confessed to Lieutenant Robertson of H.M.S. *Confiance* that if the latter's gunboats and cutters had properly supported him, "In that case," said Macdonough, "You must have perceived that I could hold out no longer."

There must have been something in the manner of Macdonough on this occasion, some touch of grace, which won his victims, for it is recorded that for a little while afterwards they stayed on board his ship and walked up and down the quarter-deck arm-in-arm. When reading of this sword scene, one asks why no historical painter has ever discovered that it took place?

To understand the importance of this victory, one must read how it made useless an army of no less than 14,000 of the veterans of the Duke of Wellington. This army was a few miles away on shore, threatening the village of Plattsburg, and only awaiting what it expected to be the certain victory of the British fleet, before starting south on the conquest of upper New York and perhaps of lower New York too. But now that it was no longer to have unhampered transportation by boat for a hundred miles on Lake Champlain towards Albany, the hardy veterans of Wellington were required by the first principles of military strategy to beat a retreat into Canada, and did so on the very night of Macdonough's victory. This victory, says Admiral Mahan, "more nearly than any other incident of the War of 1812 merits the word 'decisive' "; and by decisive he means "not merely in relation to immediate military results but in relation to political questions involved in the pending negotiations for peace."

It is, perhaps, because the spectacular triumph of young Perry on Lake Erie had taken place a whole year before, that the sober and quiet young Macdonough's similar deed on Lake Champlain did not stir the popular heart to the tumult of applause which had greeted the earlier victory. Yet to naval officers, Macdonough's victory, as shown by professional analysis, was a greater feat than that of Perry on Lake Erie. As time went on, Macdonough's lack of a ready pen and a glib tongue did not tend to change the relative appeal to the public of the two young heroes. Macdonough was not a pleasing or an easy writer. His autobiography, written chiefly for his family, is only ten printed pages long and is an inadequate, disappointing, almost dull account of his life in the Navy from 1800 to 1822. Few midshipmen went through more thrilling experiences than he off Tripoli, but, compared with Commodore Charles Morris's narrative of the same events, in his delightful autobiography, Macdonough's story is threadbare. His self-effacement was one of his marked characteristics. When called upon for a toast at a dinner given in his honor a few days after the battle of Lake Champlain, he rose and drank, "to the memory of Commodore Downie, our brave enemy." Downie had been the commodore of the British fleet and had been killed early in the battle. If we could lay aside our admiration for Macdonough the fighter, we might the more easily perceive that his efforts both as speech maker and as writer were not inspired.

When Macdonough was going to die, he relinquished command of the Mediterranean squadron and took passage homeward in a merchant ship; but it was not granted to his longing soul to pass away in his native land. He died at sea a few days before reaching it. This was in 1825, and it was not until 1909 that a full biography of him was written by a descendant. Even Fenimore Cooper, who had the highest opinion of his abilities as an officer—higher than that of most of the officers whose lives he wrote, except Preble—did not, for some unknown reason, include Macdonough in his two volumes of naval biography. Theodore Roosevelt probably expresses the judgment of most naval students when he says that "down to the time of the Civil War Macdonough is the greatest figure in our naval history." But it is outside of his professional life as well as within it, that it is a tonic to an American to examine the character of Macdonough. His sincerity, his purity, his modesty, his courage, show him a man almost without a flaw.

WHY THEY ROLL

By Lieutenant M. E. Serat (C.C.), U. S. Navy

IN ANCIENT times there were three principal things beyond human comprehension: the way of a bird in the air, the way of a ship on the sea, and the way of a man with a maid. Scientific research during the past few years has done much to clear up the first two subjects. This discussion will deal with the ship on the sea; in particular the rolling of the ship.

Everyone knows that ships at sea sometimes roll. Some ships roll more than others. It is not uncommon during discussions to hear a ship referred to as a "roller." Generally the fact that a particular ship is prone to roll heavily on the slightest provocation is accepted by the personnel simply as an unfortunate attribute of that ship without any thought or idea of why she rolls; just as it is accepted that some people have blue eyes. There are, nevertheless, definite reasons why some ships roll more than others. Experiments and research are bringing these reasons out more and more clearly and indisputably.

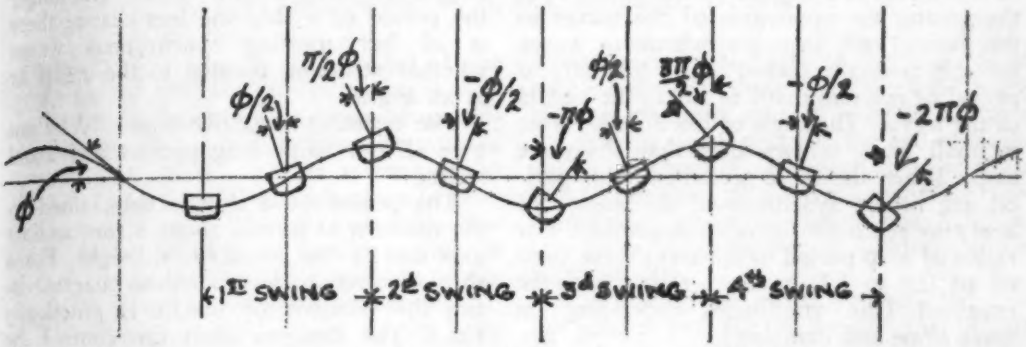
The roll of a ship is very much like the swing of a pendulum. It has two properties, amplitude and period. When we know these two characteristics for a single roll of a ship we know all about that roll. Amplitude is the angle of heel to which the ship goes over. Period is the time of a single roll, usually taken for a roll from one side to the other (for example, from maximum list to port to maximum list to starboard). Great angles of roll are objectionable not only because of the inconvenience to personnel but also because of the added difficulty in handling and fighting the ship. When a ship is rolling 20°, 25°, or 35° on a side, it is quite a problem to maintain water levels in the boilers, let alone serve the guns. A short period, that is, a quick roll, is also undesirable. When a ship rolls quickly she has a "snap" that not only causes great stresses in structure and rigging but is also very disconcerting to anyone trying to take observations or hold a gun or director sight on an object.

Except in cases where rolling of a ship is produced by artificial means a ship at sea is caused to roll only by waves. It has been pretty definitely established that the rolling of a ship depends on: The ratio of the period of the ship to the apparent period of the waves; the slope of the waves; the damping of roll characteristics of the ship. The generally accepted theory of rolling bristles with complicated differential equations and other mathematical nightmares. However, an understanding of the nature of these three points can be had without going into the mathematics.

Suppose a ship to be steaming on a calm sea, when a single wave approaches from the beam, the crest line of the wave being parallel to the course of the ship. As the face of the wave passes the ship the latter is no longer on a horizontal surface of water such as the calm sea but is on an inclined plane of water, and rolls downhill, away from the crest. The bottom of the roll is reached as the crest passes the ship. Now the ship is on the back slope of the wave which is inclined oppositely to the face. Again the ship rolls downhill, in the direction of upright from the heel imparted by the face of the wave. In this case, however, the roll due to the slope of the back of the wave is aided by the stability of the ship which is working to bring the ship upright. The righting force of stability and the inclination of the back of the wave give the ship such an angular velocity that she will carry on past the upright to an increased inclination on the other side and, after the wave has gone by, will continue to roll in her own natural period gradually coming to rest in an upright position.

Now, if instead of a solitary wave, there is a series of waves of such distance between crests and such speed of travel that the time required for successive crests to pass the ship is twice the natural period of roll of the ship (from port to starboard or vice versa) then the stability force at maximum heel will always be working with the wave

slope and every passing wave will increase the angle of roll of the ship. If there were nothing to oppose this roll the ship would eventually capsize. This case is the so-called synchronous rolling. The sketch shows graphically the condition here described.



It can be proved that if the roll of the ship is unresisted each passing crest and trough of a synchronous wave series will increase the amplitude of roll by the amount $\pi/2\varphi$, where φ is the slope of the wave. This is indicated in the sketch.

An inclination of a ship is resisted by its stability forces; but in the case of rolling in synchronous waves it has been shown that these forces work to increase the angle of roll. The gradual building up of amplitude must be opposed by forces other than stability. These forces are called damping forces. Actually there is no such thing as unresisted rolling; damping is always present. The friction of the skin of the ship moving through the water opposes rolling. Dynamic damping is obtained by installing bilge keels, the resistance of the latter to being swished through the water brings tremendous forces to act against the roll. Gyro stabilizers and anti-rolling tanks are sometimes used to oppose rolling. All of these devices have one common goal, the creation of damping forces to resist the roll.

Suppose our assumed ship has such damping characteristics that when she is heeled to an angle θ on one side and released she will roll to a lesser angle θ_1 on the other side. The damping acts nearly according to the law.

$$(\theta - \theta_1) = b\theta^2$$

That is, the angle by which each roll is diminished is equal to a constant b times the square of the angle of heel at the start of the roll; b is the "damping factor" of the ship.

It has been explained how each trough and crest of the synchronous wave train increases the angle of heel of our ship by the amount $\pi/2\varphi$. The damping decreases each roll by the amount $b\theta^2$. It can easily be seen that the ship will build up a roll until an angle of heel θ is reached such that $b\theta^2 = \pi/2\varphi$. When this point is reached the increment added by the wave is equal to that subtracted by the damping and the ship will roll with constant amplitude θ as long as conditions assumed remain unchanged.

Φ, the angle of wave slope, is determined by the height and length of the waves. Available data on sea waves indicates that the speed of travel of a well-established wave train is about the same as the speed of the causative wind. The length and period are related by the formula, $T = \sqrt{\frac{2\pi L}{g}}$. The height is nearly equal to the square root of the length.

Early in this discussion it was stated that the rolling of a ship at sea depended on the ratio of the period of the ship to the apparent period of the waves, the wave slope, and the damping of roll characteristics of the ship. The parts played by the wave slope and the damping have been discussed.

Suppose that the wave train acting on our ship has a period shorter than that of the ship. Then when the trough following the first crest reaches the ship she will not have reached her maximum angle of heel but will still be rolling away from the first crest. The face of the second wave will then find the ship rolling toward the second crest and a part of the slope will be used to bring the ship to rest reducing the maximum angle

of heel. If the period of the waves is longer than that of the ship the maximum heel will be reached before the wave slope has passed and the ship will start back in opposition to the wave slope again reducing the maximum heel. The farther removed the period of the waves is from the period of the ship the greater the opposition of the waves to the natural roll. In non-synchronous waves the ship is finally forced out of her natural period of roll and made to roll in the period of the waves. The angle of roll in these cases is small, being seldom more than the wave slope. When the wave period and ship period are nearly synchronous, the angles of heel may reach considerable magnitude. For ratios of ship period to apparent wave period of 0.9 to 1.1, heaviest rolling may be expected (the amplitudes depending on wave slope and damping).

Wherever periods have been mentioned care has been taken to designate the apparent period of the waves. The apparent period of the waves is the time required for successive crests to pass the ship. If the ship is steaming parallel to the crest line of the waves the apparent period is the actual period of the waves. If the ship is steaming at an angle to the crest line the apparent period of the waves will be increased if steaming with the waves, and decreased if steaming into the waves.

It is assumed throughout this discussion that the waves are of considerable size compared to the ship. For a ship of 60-foot beam or more, waves less than 400 feet in length would hardly affect her even when lying in the trough. Long ships steaming at an angle to the crest line might span two waves of short length in which even the effect of the waves would be small. Waves to synchronize with a ship of 14-second period in the trough would have to be 1,000 feet long. Such waves are rarely met. The longer the period of a ship the less chance there is of her meeting synchronous waves whether steaming parallel to the crests or at an angle.

The question naturally arises "Why not give all our ships long periods and avoid rolling?"

The period of a ship is determined by the moment of inertia about a fore-and-aft axis and by the metacentric height. For a ship required to have definite characteristics the moment of inertia is practically fixed. The designer then can control the period by varying the metacentric height (GM). Unfortunately, the greater the GM the shorter the period. Naval vessels are designed to be able to sustain heavy damage and still keep on fighting. As a ship is damaged and compartments flooded she loses stability rapidly. For this reason, a naval vessel must be given excess stability in the undamaged condition; that is, a large value of GM. This decreases her period which makes her susceptible to rolling. We have, then, still another compromise on our hands.

Recent research leads to the hope that damping may be made more efficient than it has proved heretofore and as a result the high seas made more comfortable for short period ships.

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THAT A SOLDIER *should criticize his superiors, either in public or in private, did not square with Stonewall Jackson's ideal of an officer and a gentleman.*—HENDERSON.

THE NAVY'S SUPPORT OF FOREIGN POLICY

By Lieutenant H. A. Rochester, U. S. Navy

THE Navy is a physical symbol of our foreign policy. Foreign policy is considered "that formulation of principles upon which our state bases its attitude toward other states, and the administration of those principles by official organs of government." History teaches that other nations accord respect to foreign policy in proportion to the moral force ready to demand its observance and enforcement.

The United States has not always been treated with due consideration by other powers. The defiance of our announced principle of the freedom of the seas brought on the early wars with the Barbary corsairs and the War of 1812. Fifty years after its promulgation, Bismarck called the Monroe Doctrine a piece of international impertinence. The open-door policy has needed a permanent and active naval force stationed in the Far East, to lend moral support and enforce observance of equal commercial privileges for American nationals. The Spanish-American War brought us general recognition as a world power. Yet in 1914-17, disregard of our notes of protest against unrestricted submarine warfare culminated in a declaration of war.

Sea power and the power of diplomacy are synonymous. When diplomatic relations are severed, the policy of defense is projected by pressure from the military forces. Referring to our statesmanship, the disrespectful term, "shirt sleeve" diplomacy, has no foundation in fact. The diplomacy of the United States, like its people, has been direct and frank, and its conduct compares favorably with that of older and more experienced countries. However, the catch slogan, "The pen is mightier than the sword," also has no all-supporting foundation in fact. The history of the world to date shows that when the negotiations of diplomacy have broken down the machinery of war has been started.

The United States directly and indirectly controls the greatest economic empire the world has ever known. Our government has a positive moral and ethical duty towards its own citizens and those of interrelated countries to maintain, and, if possible, advance the present standards of living and of civilization. A chain is as strong as its weakest link. Therefore, the navy supporting foreign policy must be strong enough to insure protection adequate to this tremendous responsibility.

The question is raised immediately, "As the general pact for the renunciation of war of July 24, 1929, disavows war as an instrument of national policy, are not deductions from past naval history purely academic?" President Hoover gave an answer on November 11, 1929, "The machinery for pacific settlement of disputes among nations is, as yet, inadequate." The general pact, or the Briand-Kellogg treaty as it is popularly referred to, recognizes national defense as a sovereign right.

The purpose of this paper is to review events in the history of the United States wherein the Navy supported and enforced foreign policy. Popular knowledge is acquainted with the naval function of providing protection against invasion from the sea, but not so well known is the necessity for protection of our increasing sea commerce. The United States, concerned with the internal development of its wealth of natural resources, has but recently taken a dominating place in external affairs. A nation like England, dependent on the sea for its existence through the supply of food and raw materials, has learned through centuries of bitter experience of the need of adequate naval forces for its very survival. Our overseas commerce, a fast growing institution, is accentuating our reliance on sea lanes. The following review of the past vicissitudes of our ocean trade will aid in shaping future protective measures for our foreign policy.

Freedom of the seas.—Today, freedom of the seas is a principle that calls for observance and enforcement only in the event of war. The seas are well policed, and

piracy extirpated with occasional exceptions on the south China coast. Conditions, however, were not always so. In the early days of the republic claims of dominion over adjacent seas, the unaccepted rights of search, and the claims of legal piracy had to be disavowed. The American statesmen of the day initiated the time-honored doctrine that "a free ship makes free goods."

After separation from Great Britain, the thirteen colonies found their seagoing commerce no longer under the protection of a powerful naval force. The arming of merchantmen was compulsory in England in the seventeenth century. The next century saw ships still constructed, if not actually equipped, as potential privateers and men-of-war. Pirates and marauders preyed on insufficiently protected shipping.

The Barbary states of Morocco, Tunis, Algiers, and Tripoli demanded that all commerce sailing in the Mediterranean Sea, in waters adjacent to their countries, pay tribute.

When the new government under the Constitution was formed, Jefferson, as Secretary of State, declared the determination of the United States "To prefer war, in all cases, to tribute under any form," but a Navy was wanting to make the declaration effective.

Treaties for the payment of tribute were made with each of the four states. As a result, much money was placed in the coffers of the pirates, when a much smaller sum spent on a navy would have destroyed the corsairs' power and retained the national honor.

In 1793, England and Portugal opened the Atlantic to the Barbary pirates for preying on commerce, particularly American. England was not above fostering conditions that hindered the shipping of other nations. A year later, our government, receiving no just hearing, ordered the construction of six frigates, the real beginning of our permanent Navy.

A few years later, our former ally, France, also demonstrated that she had not yet learned to render proper immunity to our peaceful commerce. In 1798, French privateers and men-of-war plundered American ships on the high seas, and in a few cases, in our own territorial waters. Official protests to France brought many promises in reply, but no practical results. Congress then declared all treaties with the French null and void, and a virtual state of war ensued without any formal declaration to that effect. American privateers and men-of-war, especially in the West Indian area, soon taught France her error. After two and a half years of fighting, a treaty of peace was signed. Thereafter, American diplomacy was treated with more consideration upon the lodging of protests to that government.

Tripoli was next in line for a lesson. The Bey of Tripoli high-handedly made exorbitant and humiliating demands on the American nation. Imperiously, he repudiated the existing treaty with the United States. Our young Navy with the aid of the brilliant exploits of Stephen Decatur and the able leadership of Commodore Preble broke the Tripolitan power. From the treaty of peace in 1805 to the outbreak of the War of 1812, American commerce in the Mediterranean was treated with increased respect.

During this period, Great Britain, pressed by the Napoleonic Wars, gave but scant attention to our conception of the freedom of the seas. Needing man power, Britain stopped American vessels at sea, removed members of the crew, and declared them British subjects on the slightest pretext. At times, so many seamen would be impressed that vessels were left to proceed with undermanned crews. Objection was not made so much to the principle of British municipal law, known as the doctrine of indelible allegiance, as to the British claim that they were exercising a lawful "right of search." The United States, admitting the belligerent right of search, granted its employment for enforcing blockades, seizing prize goods and members of the enemy military forces, but denied the exercise of impressment of seamen under this right. England answered our diplomatic protests with evasive counter contentions.

With England's resources severely drained by the continuous wars, the encroachment of American shipping on her trade routes did not alleviate Britain's uncompromising attitude. Jefferson, determined to make a peaceful reprisal, declared a commercial embargo against England. As a result, our growing merchant marine was dealt a severe setback, our export industries were stopped, and more than the lost sea trade was gained by England. In the end, the embargo collapsed, and the United States received the greater harm.

British orders in council further restricted our trade. Our own coasts were blockaded. The coasts of countries controlled by Napoleon were blockaded. Protests against the non-observance of our rights as neutrals were disregarded. The question of the impressment of American seaman turned out to be unnegotiable. Accordingly, war was declared in 1812.

Ship for ship, the American Navy astounded the world in its ability to cope with the world's premier sea fighters. However, the sea power of our young and undeveloped nation was not adequate to prevent the burning of the Capitol at Washington and a major land operation against New Orleans. In the peace of 1814, Great Britain did not specifically abandon her claim of the right to impressment of seamen, nor did she repudiate the illegal seizures authorized by her orders in council, but she abandoned these practices in fact. The war stimulated the American people to a sense of national consciousness, and public opinion called for the removal of Algerian oppression of our commerce in the Mediterranean Sea.

The Dey of Algiers, probably under the impression that the American naval ships would be blown off the face of the globe by the British, made increased demands on American shipping, and then dismissed our diplomatic agent in the person of the American consul general. President Madison's answer was the dispatch of a squadron under Commodore Decatur and another under Commodore Bainbridge. Algiers, Tunis, and Tripoli were reduced to submission by forceful action. Instead of paying tribute, indemnities were secured for recently captured American ships and nationals. The Moslems, disregardful of diplomatic notes, were taught to understand the language spoken by the guns of the naval vessels. The Navy's support of our foreign policy in the destruction of the Barbary corsairs resulted in initiating commercial stability for all nations in that section of the world.

Peaceful sea interests were now free from oppression for the long period of peace that followed. After the Crimean War, European powers drew up the first codification of sea law, as provided in the Declaration of Paris of 1856. The United States was about to ratify this declaration at the outbreak of the Civil War, when Great Britain stated that she would not regard its provisions applicable to the internal differences then existing in America. Privateers, fitted out in British ports, wrought havoc with Union commerce. In 1871, Great Britain agreed to arbitrate the claims against the Confederate raiders, the *Alabama,* the *Florida,* and the *Shenandoah,* but this late award did not aid the federal government in the black years of the war.

At the beginning of the World War in 1914, Great Britain and Germany adjusted their conceptions of maritime law to fit their individual needs. The combatants based their interpretations of the rights of neutrals on expediency and not on established principle. The United States suggested without success that the combatants observe the unratified Declaration of London of 1909. This country further proposed that the belligerents agree to limit the use of mines, to restrict the employment of submarines against unarmed merchant vessels except under the previously acknowledged rights of visit and search, and to observe our old conception of contraband. Both sides claimed to be in accord with our wishes, but made reservations and modifications that nullified their expressions of cooperation. Upon the sinking of the *Lusitania* with the loss of American lives, an attempt was made to define the status of armed merchantmen and of submarines. The answers of both Great Britain and Germany were indefinite and unsatisfactory for our purposes.

The government was given scant respect in attempting to secure recognition for us under the principle of freedom of the seas. A secretary of state resigned. What was to be done? There must be some agency to support our foreign policy. The answer was given in approving the naval program of 1916, which would have given us naval supremacy after the war. Fire insurance should be taken out before, not after, one's house has burned down. The people came to realize that the neglect of our Navy results in the contempt of our rights by other nations. Germany's campaign of unrestricted submarine warfare, declared in the early part of 1917, disregarded point-blank our announced diplomatic policies. The employment of the military forces was the only resource left, and accordingly war was declared.

In the final analysis, only an adequate Navy can assure our ocean commerce and merchant marine of the freedom of the sea.

President Wilson, convinced that arguments and notes exchanged with belligerents were useless without support by strong moral force, recommended in his St. Louis speech of February 3, 1916, "incomparably, the most adequate Navy in the World."

The Monroe Doctrine.—The Monroe Doctrine is generally considered our major foreign policy. Our early statesmen maintained a policy of self-determination, isolation, and non-intervention, steering clear of the interrelated European wars that extended to the Americas. Self-preservation and protection warned the young government to check European expansion in the new world. From the expression of a weak nation against aggrandizement of old world nations, this doctrine advanced to international recognition in the drafting of the Covenant of the League of Nations.

In the early part of the nineteenth century, Russia, Prussia, and Austria formed a league, commonly referred to as the Holy Alliance. After restoring Ferdinand VII to the throne of Spain, the allies turned to America. These monarchies, apprehensive of the growth of representative republican governments, intended to recover Spain's lost colonies of the new world. In 1815, the United States had already recognized as belligerent states, the majority of the colonies which had revolted against Spanish rule. Should the powerful Holy Alliance, with expressed plans for suppressing republican government, cross the seas, our national safety would be endangered. Great Britain, too, preferred to preserve the *status quo.* A large and profitable trade had been built with the revolted South American states. Should Spain regain these colonies, this lucrative trade would be taken from British hands and monopolized by Spanish merchants and Spanish ships.

Canning, the British secretary of state for foreign affairs, calling attention to our common interests, suggested a joint declaration with the United States against intervention by the alliance for the recovery of Spain's lost colonies. This suggestion for joint action was rejected, and President Monroe delivered his famous declaration to Congress on December 2, 1823.

Simply, the Monroe Doctrine is a statement of our policy that the Americas are for the Americans. The President announced objection to the further acquisition of political possessions by European nations in the Western Hemisphere, and to further colonization by European nations of this continent. Great Britain had made known already her disapproval of the alliance's proposed operations. The Monroe Doctrine, ready to be backed up by Great Britain, the world's most powerful sea power, had the desired effect, and the Holy Alliance abandoned the idea of invading the new world.

In 1860, Spain, France, and Great Britain took under consideration armed intervention in Mexico to protect the interests of their nationals in the then bankrupt and anarchistic country. The three countries combined and landed military forces in Mexico. Unfortunately, our Civil War had broken out, and Secretary Seward could protest with little vigor. In 1862, the Spanish and British forces withdrew. On the other hand, France, under Napoleon III, seized the government and established a new French colonial empire under Archduke Maximilian of Austria. The United States Army and Navy were occupied with troubles at home, and so we could do little more than voice our disapproval.

With the Civil War settled, the United States was able to take a firmer stand. Napoleon III was informed that the presence of French troops in Mexico was a matter of vital concern, and Austria notified that if troops requested by Maximilian were furnished, this country would no longer remain neutral. Soon thereafter the French troops were recalled to native soil to meet Prussia's threats, and no soldiers were forthcoming from Austria. The expedition ended with Maximilian's execution. This serious attempt against the Monroe Doctrine was quelled by militaristic developments on the European continent, and by the regained ability of the United States to make vigorous diplomatic representations.

In 1894, Venezuela complained to the United States, asking intervention in compliance with the Monroe Doctrine. The boundary line between British Guiana and Venezuela had never been definitely settled. The British, with certain gold fields in view, refused to arbitrate, and pushed their claims further into the disputed territory. The United States accepted the invitation and commenced negotiations with Great Britain. Unconcerned, the British further expanded their mining operations. President Cleveland, through Secretary Olney, addressed a sharp note to the British govern-

ment: "Today the United States is practically sovereign upon this continent, and its fiat is law upon the subjects to which it confines its interposition." Great Britain did not treat our advances seriously, and showed no disposition to arbitrate. Diplomatic means were coming to an end. President Cleveland presented the matter to Congress, practically threatening war if England persisted in her refusal to negotiate. Startled, Great Britain became more tractable.[1] Upon a threat of force, she seemed to realize the advantages of arbitration. Thereafter, Great Britain gave a mixed commission every opportunity for studying the situation, and the dispute was amicably settled.

Venezuela again claimed our attention in 1901. England and Germany placed the South American country under a "pacific blockade" because of nonpayment of debts. When the two European nations contemplated military occupation, Secretary Hay notified them that the matter should be subjected to arbitration. England demonstrated her sincerity by stating that she was ready to welcome any aid in the collection of these debts. Not so Germany. The latter country practically ignored our diplomatic correspondence, and proceeded with her plans for military intervention.

Germany's refusal to arbitrate could mean but one thing: acquisition of a foothold on the Venezuelan coast. But two years before, the Germans had seized Kiachow (Tsingtau), China, on a slight pretext, and quickly established a military and naval base there. President Roosevelt did not intend having a naval base of a European power within striking distance of a possible Panama canal and our own seacoasts. Forcibly, he informed the German ambassador that unless arbitration was consented to, the American fleet, then holding exercises in Caribbean waters, would proceed to Venezuela and prevent the landing of German military forces. Germany, unimpressed, refused to open negotiations. President Roosevelt informed the German envoy that, unless an answer agreeing to arbitrate was received within forty-eight hours, Admiral Dewey and the fleet would leave a day sooner than originally planned. Within thirty-six hours, the Kaiser consented to arbitration.[2]

The incident of Germany and Venezuela showed the world that the armed forces of the United States were ready to demand observance of the Monroe Doctrine. No longer was it necessary to have Great Britain's interests coincide with ours, and thereby have the assurance that the Monroe Doctrine would be backed up by the guns of the British Navy.

The Monroe Doctrine has gone through the evolution from von Bulow's "a theory launched venturesomely upon the blue waves of conjectural politics" to incorporation in art. XXI, League of Nations Covenant. The modern interpretation, given by Secretary Hughes in 1923:

> It is opposed to any non-American action encroaching upon the political independence of American States under any guise, and to the acquisition in any manner of the control of additional territory in this hemisphere by any non-American power.

This policy is essentially defensive. It has been, and continues to be, an important factor for our peace. It strengthens the security of the Panama Canal, and prevents non-American nations from getting closer to our coasts.

The doctrine's influence for peace is illustrated in the two cases of Venezuela. However, our diplomatic notes must be supported by other agencies than reference to precedent and international law. That far-seeing and practical statesman, President Roosevelt, observed: "If we possess a formidable Navy, small is the chance indeed that we shall ever be dragged into war to uphold the Monroe Doctrine."

The open-door policy.—The American peace commissioners in Paris, in 1898, stated that the policy in the Philippines would be "to maintain an open door to the world's commerce." This statement was in contradistinction to the actions of other nations in establishing spheres of influence in the Orient. Japan was in Korea, Russia in Manchuria, the British in various treaty ports and concessions, and the French in Indo-China. After Germany's seizure of Kiachow, Secretary Hay, in 1900, sent a circular telegram to all nations concerned, stating the desire of the United States "To seek a solution—safeguard for the world the

[1] EDITOR'S NOTE: Possibly Great Britain's South African troubles at this time, as well as the rising German menace may have influenced the change of position.

[2] EDITOR'S NOTE: All authors do not agree with this version.

principle of equal and impartial trade with all parts of the Chinese Empire." This note, advocating "the principle of equal and impartial trade," is popularly referred to as Hay's open-door policy.

The open-door policy is an application of the most favored nation principle whereby all trading rights granted to other nations are also granted to merchants of the United States. It is an insistence that citizens of the United States shall have an opportunity to trade with the Chinese on equal terms with other nations. The apportioning of concessions in China was similar to the parceling of African territory by European nations. Countries established trade monopolies in their own spheres of influence to the exclusion of legitimate American business. The vast potential markets of the Orient appealed to our commercial instinct for future development. It was and is incompatible with our foreign policy to establish exclusive economic privileges in weaker countries through military and political pressure.

When the clipper ships of New England carried merchandise to the Orient in exchange for tea, spices, and silks, Great Britain was the most influential naval, commercial, and political power in the Far East. The rather humiliating phrase "American commerce crawling behind British guns" had some basis in fact. However, the initiative and success of officers of the United States Navy in opening new ports for commerce compensated for our early lack of sufficient naval protection.

Great Britain's dissatisfaction with certain trading privileges resulted in the so-called Opium War of 1840. China acknowledged British claims in a treaty signed on the decks of the old line-of-battle ship H.M.S. *Cornwallis* at Nanking, actually 250 miles inland in a foreign country. Captain Lawrence Kearny, U. S. Navy, perceiving the advantages ceded to British trade with the subsequent disadvantages to American commerce, immediately forwarded the facts to Washington. As an answer would not be received for months, he made advances to the Chinese government, and secured for the United States the extension of all trading rights and privileges that had been granted to the British. The timely information at Washington brought an American mission to China under Caleb Cushing, who, in 1844, concluded our first treaty with that country. By his alert grasp of the situation, Captain Kearny's action resulted in giving us the "most favored nation" treatment and in stabilizing our growing trade with that country.

In the meantime Japan had carried the exclusion of foreigners to the point of actual isolation. All nations except the Dutch had been barred from entering her ports or territory for the previous 200 years. Stimulated by the Mexican War, the Oregon Treaty, and the discovery of gold in California, shipping increased between our Pacific coast and China. It became imperative to have entry into the harbors of Japan for overhauling, refueling, and obtaining supplies. Accordingly, the government ordered some naval ships to Japan to ascertain the Japanese attitude, and to start negotiations for opening the latter's ports and harbors.

Commodore M. C. Perry, commanding four ships, anchored in the Bay of Yedo in July, 1853.

When he was directed to go to Nagasaki, he refused; when ordered to leave the bay, he moved farther up; and he found the nearer he approached the imperial city, "the more polite and friendly they became."

He made preliminary overtures, studied the reactions of the Japanese, and departed. On his return, the following February, a preliminary treaty was made. Perry, by his tact, firmness, and insight into oriental character, opened certain ports to commerce, and paved the way for the Harris Treaties of 1857-8. France, Great Britain, and, later, other countries followed in procuring entry to these new markets for their trade. Thus, Commodore Perry opened the door of the world to Japan, and in keeping with the "most favored nation" principle, the door of Japan was opened to the world. In Japan today, Perry's name is fittingly a household word.

Korea, too, pursued the policy of isolation. Japan had succeeded in opening commercial relations, but the United States had no success in attempting to do likewise in 1878. Four years later, Commodore R. W. Shufeldt, U. S. Navy, was given orders to treat with the hermit kingdom. He succeeded in concluding a treaty wherein Korea agreed to further commercial relations and diplomatic negotiations. Commodore Shufeldt's treaty was the first one made by a western power with Korea, and like the opening of Japan, cleared the way for the commerce of other maritime states.

The open-door policy, although signalized in its announcement in connection with Chinese affairs, is part of our foreign policy in all sections of the globe, and has recently been exercised in mandated territories. This policy is a corollary of the principle of the freedom of the seas. A merchant marine with a protecting navy to assure safe and open sea routes is not enough. Our merchants must be assured of fair and equable treatment in foreign ports with no discrimination in fees or privileges. If American interests, previously established under reasonable conditions in another country, cannot be adequately safeguarded by that country, the naval vessels are called upon to protect American lives and property.

On account of unsettled conditions, an Asiatic fleet is permanently stationed in the Far East. An illustration of the need of naval ships in those waters was given in the shelling of Nanking in March, 1927, when the U.S.S. *Noa* and *Wm. B. Preston* assisted in the evacuation of American nationals and the American consul. In the summer of 1928, the Nationalist flag and the five-barred North Chinese emblem were shifted three times in Chefoo. Each shifting of allegiance was accompanied by fighting and disorder. Only the presence of our destroyers in the harbor assured safety for the American consulate, the American missionary schools and hospitals, and commercial interests.

From Shanghai's bund, you can generally see American, British, French, Japanese, Portuguese, and Italian men-of-war. Each nation represented is prepared to carry out its national policies and protect the lives and property of its citizens. An editorial writer and keen political observer of the Orient recently made the following comment:

> Were it not for the American Navy, the open-door doctrine would be a mockery and China would long since have been carved into foreign protectorates.

The Caribbean policy.—The Caribbean policy is definite and distinct from the Monroe Doctrine. The former gives the United States the rôle of international policeman in the Caribbean area, while the Monroe Doctrine is a policy against the extension of European power in the Western Hemisphere. It is an economic and administrative policy to preserve order and stability in these Latin American countries that are vitally situated for the security of the Panama Canal and for the preservation of our national safety.

The Caribbean policy, or the doctrine of paramount interest in the Caribbean, received official announcement in the Platt Amendment of 1901, later incorporated in a treaty with Cuba. This amendment states first, that Cuba shall never enter into any treaty with any foreign power which will impair her independence; second, that the United States shall have the right to maintain order in Cuba; and, third, that Cuba shall not contract debts which are beyond her financial resources. The West Indian and Central American countries need capital to develop their natural raw materials and soil and thereby build up a citizenry capable of conducting a civilized and responsible state. However, some of these countries disclose an anarchical record of revolutions and financial unstability. Unsettled conditions have made it necessary for a stronger nation to bring order out of chaos. Rather than leave such tasks to a foreign power, offering temptation for infringement on the Monroe Doctrine, the United States has accepted the duty, with the correlated responsibilities, of maintaining order in this area.

Although some have objected to the abruptness that marked certain of the negotiations, the acquisition of the rights to build, operate, and fortify a canal on the Isthmus of Panama stands as one of the greatest diplomatic strokes of our foreign policy. The canal, opened to shipping in 1914, has passed increased tonnage each year, reaching 30,553,006 tons in 1929. It has cut about 7,800 miles from the New York-San Francisco water route with a consequent reduction in freight charges and time of transit. The decreased cost of merchandise has raised immeasurably the standard of civilization in practically all countries of the world. A former secretary of state has voiced our attitude towards this unparalleled engineering feat:

> We deem it to be essential to our national safety to hold the control of the canal and we could not yield to any foreign power the maintaining of any position which would interfere with our right adequately to protect the canal or would menace its approaches or the freedom of our communications.

Conditions in West Indian republics have tested our Caribbean policy. In 1904, France threatened to seize the customhouses in

Santo Domingo City because custom receipts were being flagrantly diverted to private purposes. The Dominican Republic, on the verge of bankruptcy, was not meeting obligations on a government loan, mostly held by the French. Intervention by a stronger nation was imperative. Rather than have a European nation attend to this task in a region so close and vital to this country, the United States assumed fiscal control. After a period of insurrections and disorder in 1916, Admiral Knapp declared the Dominican Republic under the military administration of the United States. Marines were landed and remained there until 1924. The American military forces were withdrawn as soon as the organization of a permanent and stable government was indicated.

In the early part of 1914, Great Britain asked Haiti for the payment of an indemnity while France and Germany demanded control of the customs. These countries were weary of the neglect of governmental and other debts under a rule inclining to anarchy. The next year, Admiral Caperton ordered a landing force ashore upon the assassination of the President and the public mutilation of his corpse. With no marked improvement in conditions, he placed the country under a military protectorate. A responsible government is being developed under the guidance of the United States. The gendarmerie, officered by members of the U. S. Marine Corps, has established order, and marine and naval officers have aided in the restoration of finances, the promotion of education, the improvement in hygienic and health conditions, and the furthering of other measures for creating an effective citizenry.

The geographical location of Nicaragua is of particular importance in the security of the Panama Canal. In 1916, the United States obtained by treaty the exclusive right to build a Nicaraguan canal. Whether the latter canal is constructed or another set of locks is added at Panama, Nicaragua remains an invaluable strategic key to our safety.

As on previous occasions, a naval landing force was sent ashore in 1912 to protect American lives and property. At that time, the Nicaraguan government requested a permanent guard to aid in stabilizing the government, and consequently a detachment of 100 marines was permanently stationed at our legation in Managua. The marine guard was withdrawn on August 5, 1925, and the strong moral force for peace went with it. Three weeks later, the Chamorro faction seized the cabinet officers and overthrew the constitutional government. Disorder followed. In 1927, Great Britain and Italy requested the United States, in accordance with our paramount interest policy, to protect the lives and property of their nationals. Additional cruisers were ordered to these waters to augment the marine and naval landing forces which had been placed ashore the previous year. Admiral Latimer established neutral zones, and took other measures to protect the legitimate interests of the foreigners. The Navy prepared the way for the investigation and negotiations by the Honorable Henry L. Stimson, President Coolidge's representative, and the subsequent restoration of peace and order.

Our neighbor, Mexico, has also called for the presence of our Navy. General Huerta in a coup d'état during which Madero, the constitutional president, was killed, seized the wheel of the government. At that time, the value of American interests in that country exceeded the total wealth of the Mexicans themselves. Huerta favored the British and German interests in detriment to our own. Incidents occurred where the treatment of American property was just short of illegal confiscation. On April 21, 1914, the American naval forces took Vera Cruz after some sharp fighting. The American fleet established a pacific blockade of Mexican ports until the subsequent flight of Huerta and the return of a constitutional government.

The Caribbean policy calls for the preservation of order and stability in the West Indian and Central American countries washed by the Caribbean Sea. This is an area whose waters not only separate us from the Panama Canal, but also actually touch our shores. Admiral Mahan's dictum is more authoritative than ever: "One thing is sure. In the Caribbean Sea is the strategic key to the two great oceans, the Atlantic and the Pacific, our own chief maritime frontiers."

Aircraft and larger and faster surface ships are bringing this area closer to the inland districts of our country as well. Unsettled conditions in these waters throw the balance against the equilibrium of our national safety.

Foreign trade.—The principles of the freedom of the seas and of the open door

apply directly to our foreign commerce, while the Monroe Doctrine and the Caribbean policy are concerned politically with our national safety and economic protection. Foreign policy, as emanating from the Department of State, treats with the diplomatic protection of our foreign trade and investments from discriminations contrary to our announced principles and doctrines. On the other hand, the Department of Commerce develops new markets for American business, and publishes valuable trade information in its commerce reports, "Yearbooks," "Monthly Summaries of Foreign Commerce," and other publications.

Today, the United States controls a vast economic empire with the only close rival in Great Britain. In 1914, we were placed in the fortunate commercial position comparable to England's at the close of the Napoleonic Wars a century earlier. With all their energies taxed by the gigantic struggles of the World War, European countries came to American commodity and money markets. Home industries were stimulated in the demand for articles for export, and foreign trade pyramided. Bankers making loans to foreign governments and enterprises have seen much of this money return in trade to America. The New York *Times* of June 12, 1930, carried an advertisement for a German government bond issue of $98,250,000. American business is penetrating far-flung lands among strange peoples. American capital is revolutionizing the production of nitrates in Chile; a domestic company has leased 1,000,000 acres of land in Liberia for rubber growing; oil companies market their surplus kerosene in China, carried to inaccessible provinces by native carriers; old California newspapers are shipped to Siam for use as wrapping paper. No undertaking is too large or too small.

The Department of Commerce has trade commissioners and commercial attachés, separate from consular representatives, stationed so as to cover all parts of the world. A subdepartment, the Bureau of Foreign and Domestic Commerce, receives more than a thousand inquiries daily for new markets for absorbing surplus goods. The surplus production has to be sold to keep up industrial activity. Eight years ago, Secretary Mellon wrote in his annual report, "Business in this country cannot increase indefinitely without its foreign markets." The value of our foreign trade was doubled from 1913 to 1927. Still, many of our people are not sea-minded, and do not associate national prosperity with over-seas commerce. The present depression emphasizes the need for this foreign trade.

The majority of goods and freight should be carried in American bottoms to be independent of the restrictions of other nations. Dependence on ships of registry other than our own opens American business to freight charge discriminations, shipping delays, and other hindrances fatal to close competition. Great Britain's Stevenson Act, quadrupling the price of rubber, was a practical warning of the arbitrary action of a foreign monopoly. Yet, American ships carry only one-third of our foreign trade. To avoid the dictation of foreign monopolies, the expansion of the merchant marine should be further encouraged.

As our interior is more thoroughly developed and as immigration is restricted, we look more to the sea and can appreciate the attitude and spirit of an English pamphleteer of 1681.

> As concerning ships, it is that which everyone knoweth and can say: they are our weapons, they are our ornaments, they are our strength, they are our pleasures, they are our defense, they are our profit. The subject by them is made rich; the Kingdom through them, strong.

The United States controls a great economic empire, second to none, with its outposts scattered in the farthermost reaches of the globe. From time to time, the State Department has enunciated policies to protect American nationals in their foreign dealings from discrimination and illtreatment. Notes of protest without moral force are not enough. Therefore, the navy, with the weapons at hand, physically supports foreign policy, and protects commercial antipodes, colonial possessions, and the lines of sea communications.

Adequate national defense.—In his message to Congress, December 6, 1927, President Coolidge stated:

> Our Navy is likewise a weapon of defense. We have a foreign commerce and ocean lines of trade unsurpassed by any other country. . . . We are charged with an international duty of defending the Panama Canal. To meet these responsibilities we need a very substantial sea armament. . . . This country can never be relieved of the responsibility of adequate national defense.

This country must be able to resist any foreign aggression or infringement of our

rights. Let us consider one of the problems involved. Theoretically, the League of Nations is the most powerful military alliance ever formulated in history. The league's covenant, art. XVI, recognizing no higher authority, requires all signatories upon call from the council to undertake "the prevention of all financial, commercial, or personal intercourse between the nationals of the covenant-breaking state, whether a member of the league or not." Note well the last eight words, *whether a member of the league or not.* The United States is *not* a member of the league.

Therefore, if a member is a party to a dispute that is being settled by arms, the United States might forcibly be denied the rights of neutrals. Those time-honored principles, for which many American patriots have shed their life's blood, the freedom of the seas and the open door, would suffer alien degradation.

Again, in a dispute unsettled by arbitration between a league member and this country, a non-member, all signatories have pledged themselves to unite against the offending nation, the United States in this case. Thus, our navy might have to face the combined navies of the United Kingdom, Japan, France, Italy, and other member states.

Conclusion.—History repeats itself. Styles of statesmanship and the external signs of formulation of policy may change with each administration and each decade. Our most marked advances in the Caribbean Sea were made under the standards of the brusque "big stick" of Roosevelt and the subtle moralizations of Wilson. However, the basic lessons deduced from history remain the same. This nation has had direct need of her military forces to solve vicissitudes in the past, and likewise will need similar aid in the future.

Let us not be misled by false prophets. A few years ago, the great advance in the stock market produced a new school of economists who recognized no shoaling waters for the bull movement, and who foresaw no normal tidal reactions to this country's uninterrupted prosperity. Since then, many a financier and business man has struck the proverbial rocks and shoals. Are the former advisers keeping constant vigil, ever alert to effect rescue? No. The discredited seers have been enveloped by the haze, and their exploded theories are now unclassified films of mist.

On the other hand, unimpeachable agencies have laid a safe and true course for us to follow. The Briand-Kellogg treaty recognizes national defense as a sovereign right. Article I, section 8 of the Constitution of the United States provides for the common defense and the maintenance of a Navy. The Navy's size has been determined by the London Naval Conference of 1930. Parity in principle and a paper Navy second to none is not enough. The Navy should be brought up to allowed strength with parity attained in fact.

Therefore, let us not forget our reliance and need of a navy for the support of our foreign policy. No peace pacts, no arbitration councils, and no mere expressions of good will have relieved us of the responsibility of such adequate naval defense.

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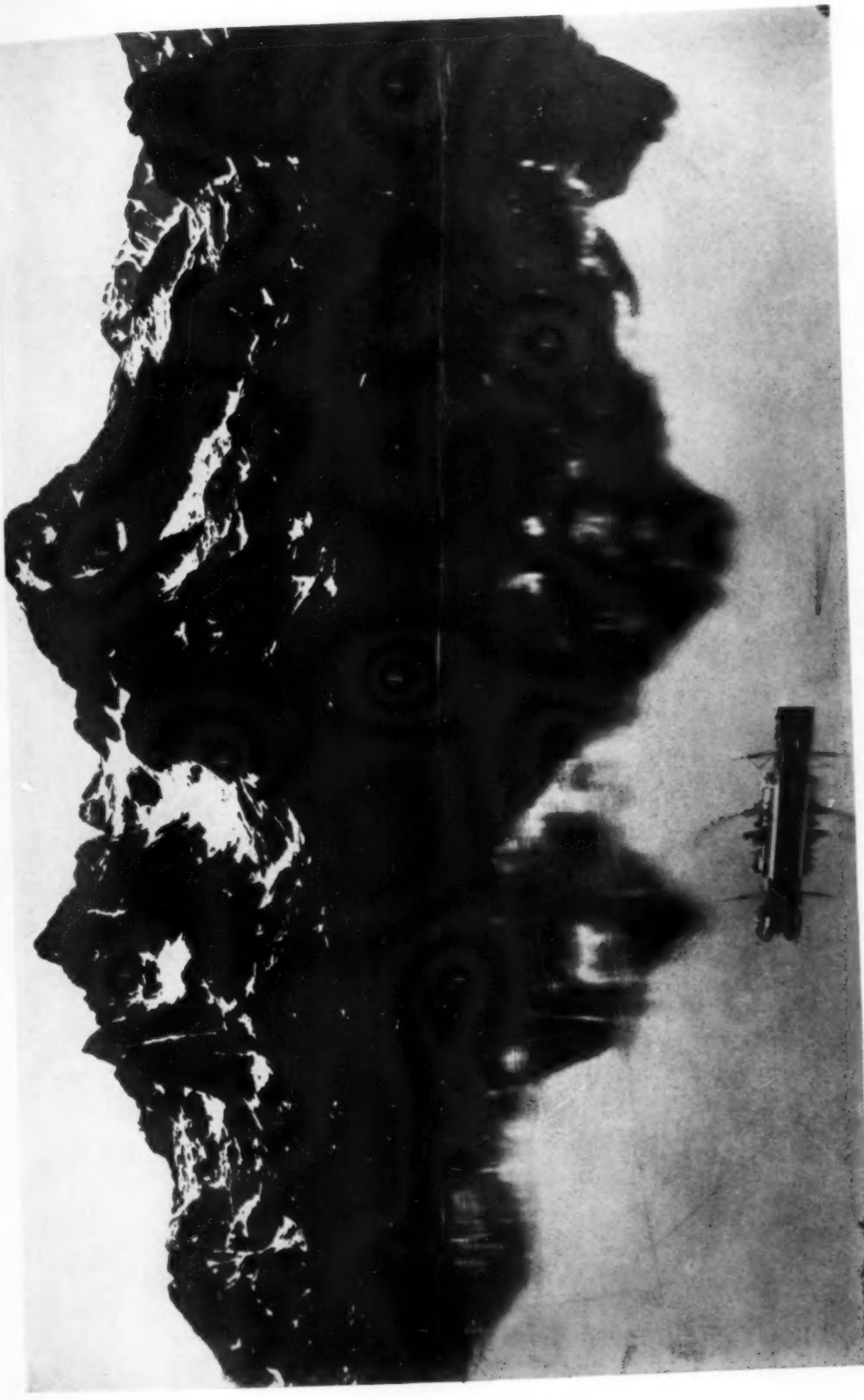
HESITATION *and half-measures are nowhere so fatal as in war. True wisdom for the general lies in an energetic determination.*—NAPOLEON.



RAFTSUND FIORD, NORWAY

By Ewing Galloway, New York

By Ewing Galloway, New York

WALL OF GREAT GLACIER, BELL SOUND, SPITZBERGEN, NORWAY

By Ewing Galloway, New York

WALL OF GREAT GLACIER, BELL SOUND, SPITZBERGEN, NORWAY

DeCou-From Ewing Galloway, New York

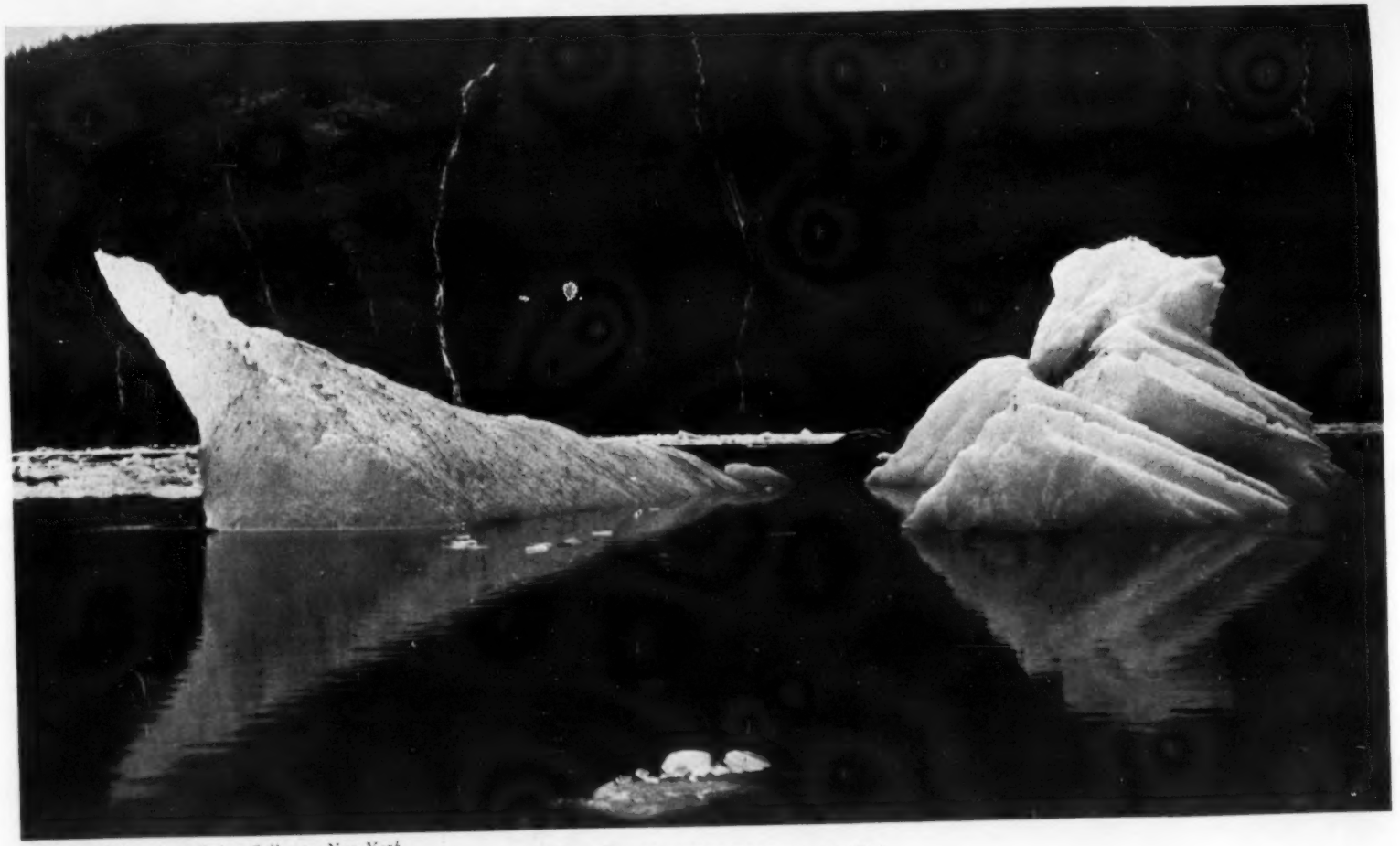
GEIRANGER FIORD, 150 MILES NORTH OF BERGEN, IS ONE OF NORWAY'S CHIEF BEAUTY SPOTS

By Ewing Galloway, New York

ICEPACKS, BERING STRAIT, ALASKA

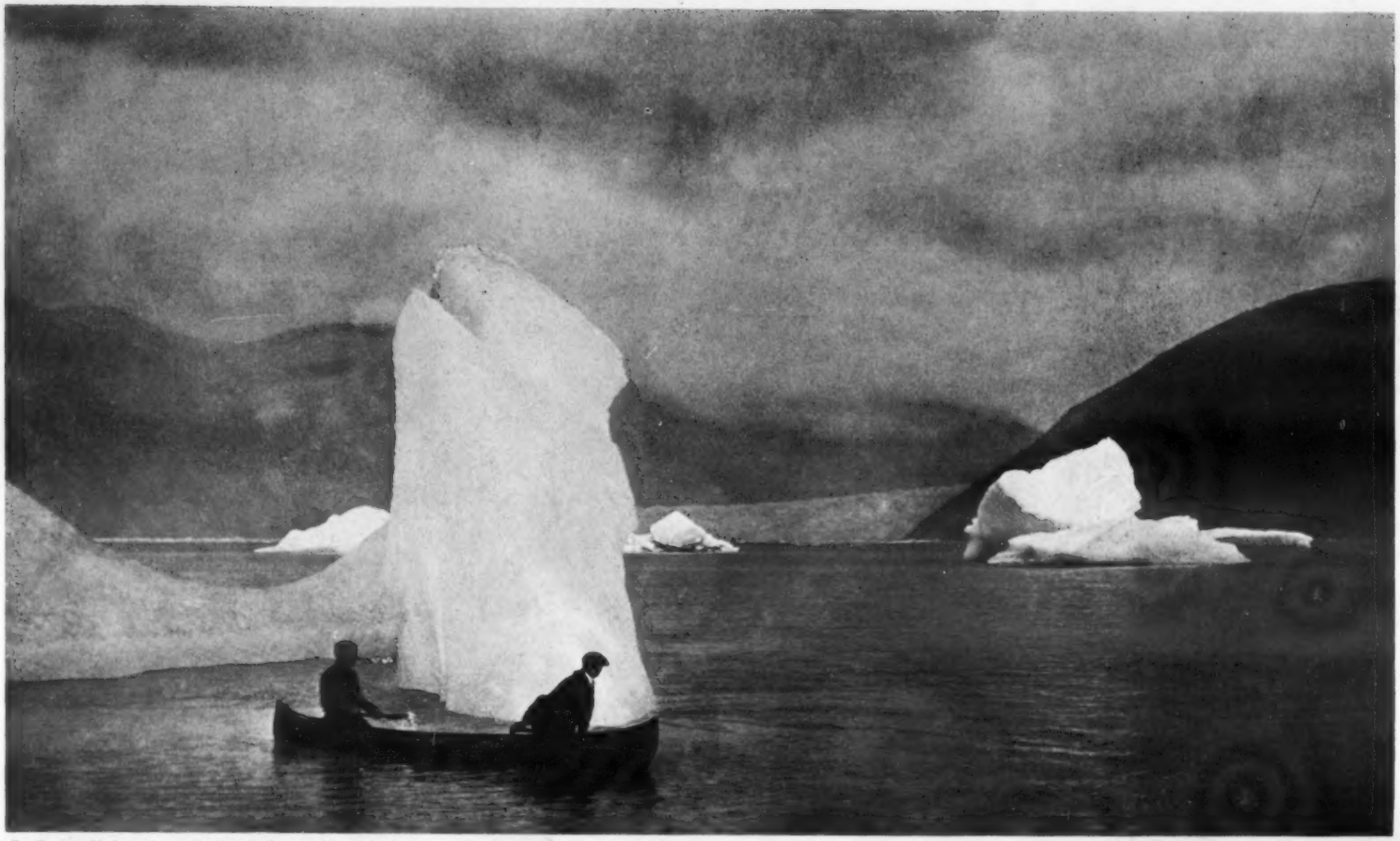
By Ewing Galloway, New York

ICEPACKS, BERING STRAIT, ALASKA



By Burton Holmes from Ewing Galloway, New York

ICEBERGS FROM TAHU GLACIER, ALASKA



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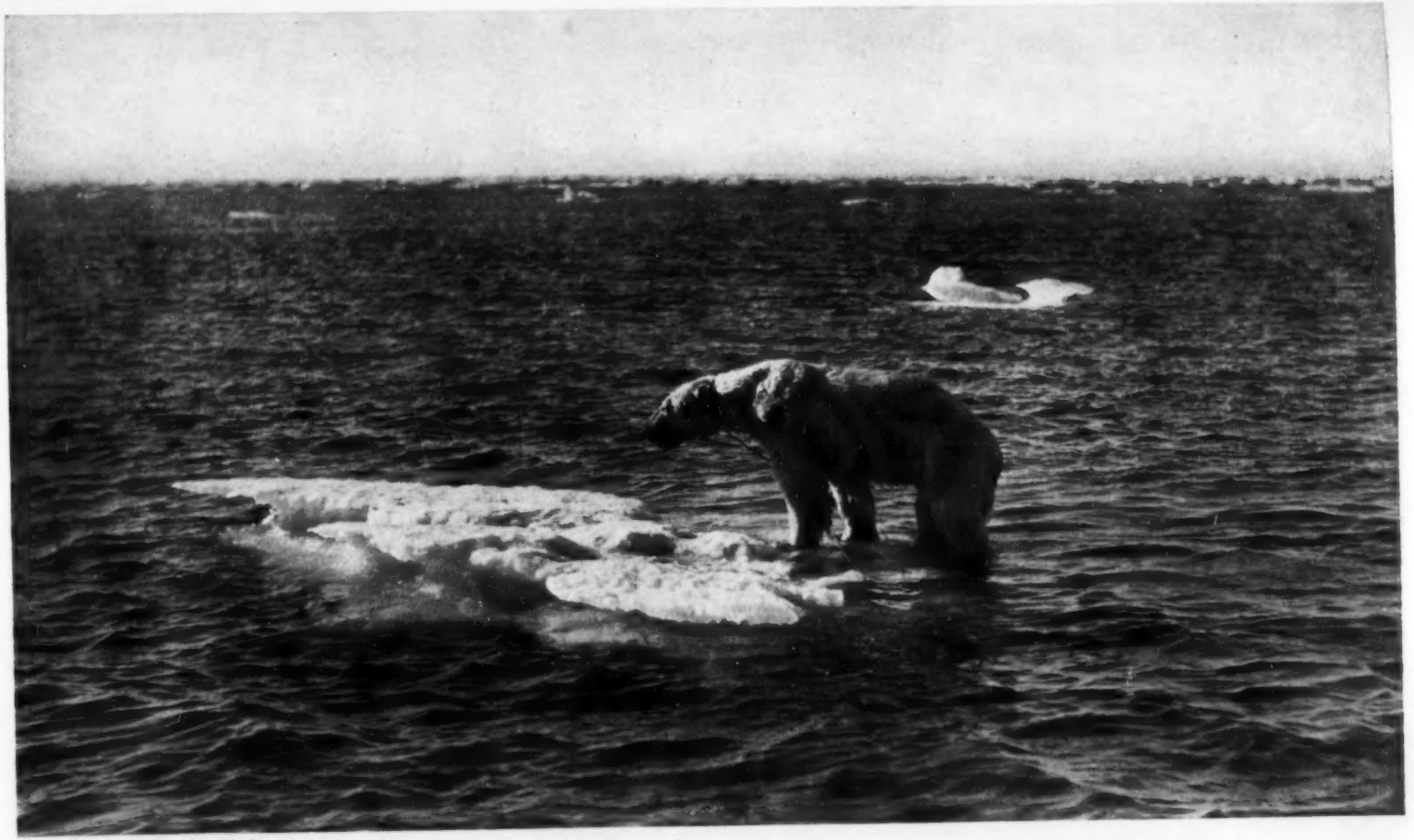

By Ewing Galloway, New York

A POLAR BEAR'S LAST REFUGE

UNALASKA, ALASKA

By Ewing Galloway, New York

UNALASKA, ALASKA

By Ewing Galloway, New York

BOMBING VERSUS TORPEDO PLANES

By Lieutenant Logan C. Ramsey, U. S. Navy

IF THE average air-minded civilian is asked to define his conception of the manner in which aircraft may accomplish the destruction of naval surface craft his answer will undoubtedly be, "Why, with huge aërial bombs, of course." A similar opinion seems to prevail in army circles as is evidenced by the following testimony recently given before a committee of the House of Representatives:

Mr. Collins: "What about battleships and cruisers?"

General Fechet: "Any battleship or cruiser can be destroyed by bombardment aviation."

Even in the Navy those who are willing to admit that aircraft can menace the safety of surface vessels are generally inclined to disparage the potentialities of forms of aërial attack other than by means of heavy bombs dropped from high altitudes. This general belief is based partially on psychological reasons, but has its main foundation in the lack of information.

Anyone who has dodged a wrench falling from an upper grating of the engine-room or attempted to avoid the danger space of a bucket of paint dropped from aloft has been mentally impressed with the possibilities of danger from aërial missiles. Those who witnessed, or read accounts of, the bombing of the *Ostfriesland* and the *Washington* can realize that under sufficiently favorable conditions aircraft bombs can destroy the heaviest ship afloat. No such mental impressions or practical demonstrations of other forms of aërial attack have been widely enough published to influence the general opinion to any appreciable extent.

Roughly speaking, there are three different types of aërial attacks that can be delivered on surface vessels. The first has already been indicated. The second is by means of torpedoes launched from planes. The third is by means of fast, light planes using light bombs and machine gunfire. As this last form of aërial attack cannot be considered as constituting as great a menace to the safety of large surface vessels this discussion will be confined to the two more potent forms. It will be further confined to consideration of types of aircraft capable of operation from aircraft carriers.

Unfortunately for the purposes of direct comparison the service has not yet been equipped with types of aircraft designed exclusively for either bomb dropping or torpedo launching. Considerations of aërodynamical efficiency alone will eventually force a divergence in type. The efficient plane designed entirely for dropping heavy bombs from high altitudes is a large, heavy plane with a comparatively great wing span. The torpedo plane, not being required to lift a heavy load to any considerable altitude, can be a smaller, lighter, and faster plane of considerably lesser wing span. Consequently for a given amount of stowage and operating space on an aircraft carrier a larger number of torpedo planes may be provided than if the same allotment of space is devoted to bombing planes. In addition, the smaller size of the torpedo planes will render their handling on the carrier much easier; a point of no small military significance as will be appreciated by those who have served in the flight-deck crews of the carriers.

While it is very difficult to forecast even immediate trends in aircraft design, present limitations seem to indicate that the bombing plane cannot be considered as being capable of taking off from the deck of a carrier with a bomb weighing more than 2,000 pounds. Such a plane would be considered very efficient if it could lift this load to an altitude of 20,000 feet and have a maximum speed of 90 knots at that altitude. This type of plane would carry a crew of four; pilot, bomber, top gunner, and a combination lower gunner and radio man. The defensive armament of such a plane would include three machine gun emplacements: one covering arcs of fire forward and upward, one for fire upward and aft, and

the third for firing through the bottom of the fuselage of the plane. The torpedo plane, on the other hand, could be developed to the point where it could attain a maximum speed of about 130 knots at sea level and still be capable of taking off from the deck of a carrier with a 21-inch torpedo. Its crew could be reduced to two men; pilot and gunner. The defensive armament of such a plane would consist of two machine gun emplacements; one for a free gun covering arcs of fire upward and aft, and the other for a fixed gun firing forward. Many may disagree with the more or less arbitrarily assigned performance figures but it is believed that fewer will find fault with the suggested tendencies of design.

Even granting that the present compromise of design in which the two types are identical persists, there are certain comparative factors involving the two different forms of attack that merit consideration. It is almost universally conceded that the danger from anti-aircraft gunfire will force bombing planes higher than 10,000 feet. In the absence of the surprise factor, such as the sudden descent through a broken layer of clouds, a bombing attack from a lower altitude is almost certainly doomed to failure unless the anti-aircraft batteries of the target have been put out of action by strafing planes or other means. Some may consider the 10,000-foot altitude entirely too low and contend that a bombing attack from an altitude of less than 15,000 feet will be broken up by anti-aircraft fire. No matter which of the two figures is accepted bombing planes may be forced, by prevailing weather conditions, to attack from a dangerously low altitude. For example, on overcast days a fairly thick layer of clouds is very frequently found at an altitude of 5,000 feet above sea level or even lower. Bombing planes would be sharply silhouetted against such a background which, in conjunction with their low altitude, would make them comparatively easy targets. As still lower ceilings are often encountered an aërial bombing attack is sometimes entirely impossible. On the other hand torpedo planes can deliver an attack under almost any sort of weather conditions in which any aircraft operations at all are possible. Only in the very rare instances in which a low lying fog exists through which the tops of the targets are visible from clear sky above, would an aërial bombing attack be possible and a torpedo plane sortie impracticable. Therefore, the availability of a torpedo plane attack may be considered greater than one from bombing planes. It may be argued that the comparative disadvantage in availability of a bombing attack from this cause is somewhat compensated for by the fact that bombing planes can attack objectives ashore. However, objectives that might be considered as proper targets for bombing attacks from fleet aircraft that cannot also be attacked by torpedo planes are few in number. For example, what objectives ashore have been assigned as targets to the aircraft of the fleet in maneuvers? The answer is the locks of the Panama Canal and the Gatun dam. Is the possibility of a successful torpedo plane attack on these points, and particularly on the Gatun dam, so remote that a torpedo net or other means of defense is not needed?

In instances where weather conditions and other considerations permit of both forms of attack, which runs the greatest risk of being broken up by enemy action before its projectiles have been launched? Some will contend that neither form can hope to accomplish any tangible results and it must be admitted that this is true of unsupported daylight attacks in clear weather. But granting that both have the support, protection, and coöperation of fighting and strafing planes and that the two attacks are delivered during the heat of a general engagement, both have a reasonable chance of accomplishing definite results.

During the bombing attack these planes will be subjected to intensive attacks from hostile fighting planes. It is admitted that a formation of bombing planes has a certain inherent defensive ability against such attacks. However, the formation is not particularly well protected against fighting plane attacks from ahead and, to a lesser degree, from beneath. Fighting planes attacking from ahead and at the same altitude will force the formation to either turn or dive in order to bring any guns to bear. As any such loss of altitude is regained but slowly when the bombers are fully loaded and as altitude must be conserved in order that the bombing attack may not be broken up by anti-aircraft fire, it is probable that the usual maneuver will be a turn. By making repeated feint attacks the fighting planes, unless opposed by protective fighters, can force the bombing formation to turn entirely

away from its objective or else accept the risk of fire from the fighters when none of the guns of the formation will bear. An aërial bombing attack, therefore, requires the protection afforded by an escort of fighting planes.

The formation of torpedo planes, during its approach, flies at low altitude and is protected from attack from beneath by the proximity of the surface. The torpedo planes can oppose fire from fighting plane attacks from ahead with their fixed guns. It might be argued that the bombing plane could be similarly equipped for the same purpose but even if this is done the advantage still rests with the torpedo planes for two reasons. The first is imposed by the nature of the two forms of attack. The bombing planes must fly on a steady course for quite an appreciable period in order that the proper dropping point for the bombs may be determined and reached. During this period any radical changes of heading would destroy the accuracy of the bombing. The torpedo planes are not so restricted. In their case it is only necessary to steady down in heading for a second or two. In fact zigzagging to avoid surface gunfire or to oppose aërial attacks is highly desirable. In addition the bomber is a heavier and larger type of plane and therefore less maneuverable and, even if equipped with a fixed gun, could not be expected to use it effectively. The torpedo plane being more maneuverable could use this weapon more effectively.

The formation of torpedo planes, then, can oppose frontal aërial attacks with fire from their fixed machine guns. Their free guns aft would cover arcs of fire in that direction and upward arcs as well. Attacks from beneath would be impossible for reasons previously indicated. There remains only the possibility of diving attacks from above in the hopes that the free machine gunners would be unable to train and depress their guns quickly enough to oppose any effective fire. And in attacks of this sort the fighting planes would also be handicapped by the proximity of the surface. After a sharp dive at high speed planes lose an appreciable amount of altitude even after the controls are set for recovery from the dive. This squashing due to the momentum of the fighting planes would necessitate their starting recovery from the dive well before the altitude of the torpedo plane was reached. As the commencement of the recovery means that the fixed gun of the fighter would no longer bear and as this restriction would not apply to the free machine gun of the torpedo plane, it follows that the latter could continue fire during the period when the range was the shortest, while the fighter would have to cease fire at a comparatively long range. If the fighter persisted in the dive to fire at very close range it would run grave risk of crashing into the surface while recovering from the dive. For these reasons the torpedo plane formation stands a better chance of beating off attacks from hostile aircraft than does a similar group of bombers. In fact, it may be contended that a fighting plane escort would not be required by torpedo planes, although such protection is admittedly requisite in the case of bombing planes. Fighting plane pilots will probably object strenuously to this contention but at the same time they will admit that definite proof either way is lacking.

In addition bombing planes are exposed to attack from hostile aircraft for a longer period of time. With no great altitude to be gained, torpedo planes can proceed directly from their carriers to their objective. The bombing planes are faced with the necessity for attaining their bombing altitude, which, with the load that must be carried, requires a considerable time interval. Thirty additional minutes' allowance for this feature of the bombing attack is not excessive. In addition, the fighting plane escort is required for a longer period, which, when the limited fuel capacity of these planes is considered, is of no small importance. Granting for the sake of argument that torpedo planes do require such escort, these fighters could be released for other activities one-half hour earlier than would be the case for the escort of a bombing group.

This extra time interval also imposes upon the officer in tactical command the necessity for choosing further in advance the moment for launching a bombing attack. Aside from this consideration this time interval imposes another comparative handicap upon the bombing planes. Assume that at the zero hour the torpedo planes can launch an attack in thirty minutes. The bombers will require an hour. Both groups will require thirty minutes to return to their carriers, the bombing planes, by gliding at full speed from bombing altitude, thus compensating for the higher

maximum speed of the torpedo planes. Assume further that an hour will be required for both groups to refuel and re-arm on the carriers. The torpedo planes, as before, will be able to reach a position from which a second attack can be delivered in thirty minutes after taking off, while the bombers will again require a full hour. The torpedo planes will then launch their second attack two and one-half hours after the zero hour while the bombers will not be able to do likewise until three and one-half hours have elapsed. Therefore, the torpedo planes have what might be termed a greater rate of fire than the bombers.

But even if they concede the foregoing, proponents of the bombing plane contend that these planes have less to fear from surface gunfire than have the torpedo planes. They assert that the effectiveness of a splash barrage from the broadside batteries of surface vessels is such that it will form a more efficient bar to a successful torpedo plane attack than does anti-aircraft fire to a bombing attack. They also assert that anti-aircraft fire may be directed against torpedo planes in addition to that from the broadsides.

Considering first the bombing attack and its surface antidote, even the most rabid supporter of military aviation must admit that anti-aircraft gunnery has been improved immensely in recent years. There is no question as to its ability to break up a bombing attack if the planes come over low enough. The uncertainty lies in whether or not anti-aircraft fire will be effective at the greatest altitude from which accurate bombing is possible. While recent developments have greatly increased this altitude, still the bombing planes must fly on a steady course, at a constant speed, and in a fairly close formation for an appreciable period just prior to the release of the bombs. The constant course and speed are necessitated by the operating requirements of bomb sights. And as the size of the pattern of the bombs dropped varies directly with the dimensions of the bombing formation, it necessarily follows that these planes must be in a relatively close formation. A single anti-aircraft burst in the center of the formation during this period would probably destroy a majority of the planes within the group. While bombing planes may fly higher than the altitudes at which anti-aircraft fire is effective, by doing so they lessen the accuracy of the bombing and even then run the risk of having a single lucky burst destroy the formation.

It is true that torpedo planes, while attacking, may be subjected to anti-aircraft gunfire in addition to that of the broadside batteries. At first thought this might seem to indicate a greater difficulty in pushing home an attack. Such, however, is not the case. Considering first the anti-aircraft angle, it seems logical that the control officers of such batteries are apt to be much more alert for the appearance of planes at an altitude than for planes flying close to the surface. Therefore, other considerations being equal, a bombing group will be sighted by these officers earlier than would a torpedo plane formation. A psychological factor enters into this equation. A person ordered to watch the sky for the appearance of aircraft almost invariably looks too high. Even experienced aviators on board ship are apt to direct their gaze at too high an angle when expecting the appearance of returning planes.

Even granting that the torpedo planes are sighted at a considerable distance, anti-aircraft fire against these targets is not apt to be particularly effective. During the period that the planes are in range the formation of the torpedo planes is well spread, so much so that the gunners will be somewhat embarrassed by the multiplicity of targets. In addition, the design of anti-aircraft guns necessitates consideration of ease of operation at high angles of elevation. This involves a relatively greater height of the trunnions above the operating platform than is the case with the guns of the broadside batteries, so that when elevated the breech will not be so close to the deck as to interfere with loading operations. At angles of depression and even when level, unless these guns are fully automatic in action, the elevation of the breech is apt to introduce difficulties in loading operations. In fact, the very essence of anti-aircraft gunnery, i.e., high-angle, concentrated fire, militates against the successful use of these guns in repelling a torpedo plane attack.

There remains gunfire from the broadside batteries. Considered even singly the effectiveness of these guns for this purpose is open to question. Certainly these guns were not particularly successful at Jutland in breaking up destroyer attacks. The *Nestor* and *Nicator* in that battle ventured to

within 3,500 yards range from a powerful division of battle cruisers and were not hit until after they had delivered their attack and were retreating. It is true that broadside batteries are far more effective now than they were at Jutland, but it may be questioned as to whether this improvement is sufficient to render them capable of destroying the smaller, far speedier, more numerous, and more widely dispersed and zigzagging targets afforded by torpedo planes. Much is heard of the probable effectiveness against torpedo planes of the laying down of a splash barrage, particularly from those who admit that it would be a difficult matter for these guns to score direct hits on torpedo planes. The theory is that by maintaining a rapid rate of fire and forming a wall of splashes at a range greater than that from which this form of torpedo attack would be effective, the torpedo planes would be denied access to the area within which they would constitute a menace. The origin of this theory was probably due to some of the pioneering torpedo drops from planes. Several years ago there were a number of instances in which operating personnel, through inexperience, launched their torpedoes when too close to the surface and the resulting splashes from the torpedoes threw the planes into contact with the surface and the planes were destroyed. It is believed that in accounts of these mishaps those without personal knowledge of aviation were mistakenly led to believe that the planes in question were destroyed by the torpedo splashes. What actually happened was that the torpedoes were dropped when the planes were extremely close to the surface, perhaps not over three feet. The splash from the torpedoes took effect on the tail surfaces, elevating the tails of the planes so much that the pilots were unable to right their planes before their noses struck the water. Had these splashes taken equal effect when the planes were at an altitude of even as little as 20 feet, the pilots would have been able to avoid disaster. However, the splash from a 5-inch shell rises with much greater velocity and to a greater altitude than does a torpedo splash, although the relative density of the two columns does not appear to be greatly different. The writer is of the opinion that a splash from such a projectile striking a torpedo plane at an altitude of 100 feet would not materially damage the structure of the plane and, while it might throw the plane into a dangerous attitude, the pilot would have a fair chance of regaining control. For that matter it would be a simple matter for these planes to fly at a higher altitude than is attained by such splashes, without exposing themselves to aërial attacks from beneath, until just before launching their torpedoes when, of course, they would have to descend close to the surface.

Even granting that anti-aircraft and broadside battery gunfire will be effective against torpedo planes attacking singly, there are still two possibilities which may enable these planes to push home an attack despite this more or less questionable handicap. The first of these is a combined torpedo attack from both aircraft and destroyers acting in conjunction. In this case the torpedo planes can remain out of range during the approach of the destroyers and then, when the broadside guns are fully engaged with these targets, dash in and launch their attack. Even granting that the destroyers will fire their torpedoes at 10,000 yards and that the planes must be within 4,000 yards, the control officers of the guns will have only a short interval in which to sight these new targets and direct fire against them. The greater portion of this 6,000 yards can be covered by the planes at full speed (130 knots), and while the planes must slow down just prior to dropping, an average speed of 100 knots for the entire distance is not an excessive estimate. This would make the time interval in question less than two minutes. A single squadron of 18 torpedo planes would, during this interval, be separated into several groups with about 200 or 300 yards' space between each group. Even granting that the planes are sighted just as the destroyers fire and that the shift in targets is made instantly, such a short time interval remains that it is very doubtful if fire could be more than opened against them before they would reach the dropping point. Certainly few of the planes would be destroyed from this cause, under such conditions.

Even this does not conclude the list of problems facing surface gunfire directed against these targets. Torpedo planes can approach almost unhindered under cover of a smoke screen laid by other aircraft. The planes can fly low enough so that they are hidden by this screen from their targets and yet high enough to evade most of the ef-

fects of a blindly laid splash barrage. In fact, under such cover the torpedoes may be dropped at almost point-blank range, although the planes are exposed only for a few seconds. The knowledge of such a protection with the resultant but momentary exposure to gunfire will have a great effect on the morale of torpedo plane personnel and makes for more accurate torpedo launching.

The bombing planes can expect no such assistance. There are no targets aloft to provide diversion of hostile gunfire and if concealment in the form of clouds is present it hinders accurate bomb dropping as much as it does anti-aircraft fire. Neither can these planes utilize the coöperation and support of surface vessels.

The relative accuracy of bomb dropping and torpedo launching from planes may now be considered. For this comparison the reports of gunnery practices are of little value. Although such reports on the whole seem to indicate a slightly greater accuracy for the torpedo plane, such a basis for direct comparison is obviously unjust to both sides. Torpedoes fitted with practice heads may be actually fired against capital ships; bombs may not. However, it is known that the accuracy of bombing falls off with increase of altitude with greater rapidity than does that of aërial torpedo launching with increase of range. General service opinion concedes a greater accuracy to the fire from torpedo planes. The same general opinion seems to prevail in the British Navy as is evidenced by the statement of Mr. Hector Bywater in the Baltimore *Sun* of April 24, 1929. In that publication, in discussing the then recent maneuvers of the British fleet, he states, "Of aërial bombing results I cannot speak from personal knowledge, but it is generally conceded that torpedo attack (from planes, as indicated by the context) is more to be dreaded."

Proponents of the bombing plane will point out that as between torpedoes launched from a range of 4,000 yards and bombs dropped from 12,000 feet the targets will have four times as long an interval in which to avoid the torpedoes by maneuvering. They will further state that the time of the fall of the bomb from that altitude (about twenty-eight seconds) is so short that the targets can do little to avoid the bombs. They ignore the fact a maneuver started during the bombing approach would affect the accuracy of the bomb dropping far more than would a similar move affect the aërial launching of torpedoes. It is admitted that maneuvers to avoid torpedoes will be more radical than those to avoid bombs. It is undetermined, however, whether or not this is a positive disadvantage to the detriment of the over-all military worth of torpedo planes. In fact the imposing of radical maneuvers to avoid torpedoes upon enemy capital ships may be highly desirable. For example, in one practice attack a battleship was forced to change course sixty degrees and to stop both engines to avoid four torpedoes that finally passed just ahead of its bow. Had the course been maintained or, even with the change of course, had the speed been continued, all four torpedoes would have scored hits. If this maneuver had been imposed upon that ship during the heat of a general naval engagement it would have thrown that battle line into considerable confusion and would have resulted in the blanketing of the guns of at least one ship.

The next point to be considered is the relative effectiveness of the bomb hit and the torpedo hit. The 2,000-pound bomb, previously indicated as being the largest size that, for the immediate future, can be used by carrier bombing planes, has between two and three times the weight of explosive carried by the war head of the aircraft torpedo. Obviously as between single hits from the two weapons, both ideally placed, the bomb hit will be far more effective. But while the torpedo hit is always located so that the explosion takes place directly against the under-water skin of the ship, the same is not true of all bombs that inflict damage. Even though near hits of bombs do considerable damage by mining effect; for this effect to be marked, the point of impact must be close to the side of the target to equal the effectiveness of the torpedo hit. It is generally conceded that bombs striking close to the side of the target are more effective than direct hits, but the area within which this effectiveness exists is comparatively narrow in width. In fact, it may be argued that a group of four bombs taking effect on a capital ship will, by reason of some of the bombs striking the water too far away from the side of the ship to take full effect, not do greater damage than that caused by four torpedo hits. However, the greater weight of the explosive in the bomb

makes it difficult not to admit a slight superiority in effectiveness to the bomb hit. Obviously, if the weight of the bomb could be increased this advantage of the bombing plane would be correspondingly augmented. But with the many arguments in favor of carriers smaller in size than the *Lexington* and *Saratoga* and the probability that future carriers will be of smaller size than those huge vessels, the take-off space available will be decreased and not enlarged. Therefore it is difficult to see how a heavier bomb can be used in the absence of some device such as a catapult to assist in launching planes thus heavily laden. And the introduction of such devices would naturally lead to other complexities. Shore-based planes, on the other hand, are not so limited with respect to the space available for taking off. Neither are such planes restricted in size as are carrier planes. A 4,000-pound bomb or even heavier for such planes seems quite practicable.

In summation, and considering types of planes capable of being developed in the immediate future, we find that a greater number of torpedo planes can be utilized for a given allotment of carrier space. These torpedo planes, in addition, can be handled on the carrier more efficiently than the correspondingly lesser number of bombing planes. Torpedo planes can attack under weather conditions in which a bombing attack is impracticable. Bombing planes are less capable of defending themselves against hostile aircraft than are torpedo planes. In addition they are exposed to such attacks for a longer period of time. The time for launching a bombing attack must be selected further in advance than must one for a torpedo plane attack and torpedo planes can attack oftener in a given interval of time. Torpedo planes can attack almost any logical target. Bombing planes run greater risk of destruction from surface gunfire than do torpedo planes. A bombing attack is more apt to be broken up by combined hostile efforts than is a torpedo plane attack, as the latter can attack in conjunction with destroyers and under cover of an aërially laid smoke screen. In addition, and this is a point that has not been brought out before, torpedo planes can, by such coöperation with surface vessels, increase the effectiveness of the surface torpedo attack. And in such combined attacks torpedo planes may be able to push home their effort almost unopposed by hostile gunfire. Bombing planes just prior to bomb dropping must fly on a steady course, at a constant speed, and in a close formation. Torpedo planes may steer erratic courses at high speed until the instant of torpedo launching and can attack in a widely spread formation. Therefore a torpedo plane attack has a better chance of being pushed home. Torpedoes can be launched from planes with greater accuracy than can be obtained in bombing. As against the foregoing the bombing planes can claim but two slight advantages. Their targets have less chance to avoid their projectiles by maneuvering and the bomb hit is more effective than the torpedo hit.

Subject to the development of planes designed exclusively for torpedo or for bombing missions, it seems logical to conclude, in the unfortunate event of war within the next five years, that a greater over-all military efficiency would result from the elimination of the high altitude, heavy bombing plane from the complement of aircraft carriers, and the substitution therefor of an additional and greater number of torpedo planes. However, the foregoing should not be construed as meaning that, during the time of peace, the development and operation of bombing planes as a distinct type should be limited in any manner until their possibilities and limitations have been definitely determined.

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DEFENSIVE BATTLE *never brings about the destruction of enemy forces.*—FOCH.

CREATING A HORIZON

By Lieutenant Commander J. Y. Dreisonstok, U. S. Navy

THE modern navigator is so indoctrinated with the use of the sea horizon, that it becomes difficult to persuade him that there are other methods of bringing down a heavenly body so as to obtain a true altitude. In the good old days it was not an infrequent occurrence to see a ship's captain make use of a soup plate of molasses in taking his time sight. And this is still a good practice, especially when one takes full advantage of the use of gimbals by placing the plate of molasses atop his pelorus.

The vagaries of our friend "sea horizon" are so many that at times one wonders where he is. Especially is this true in localities where there is a marked difference in temperature between the air and sea water. This is especially so around the Gulf Stream where the water is so much warmer than the air that the sea horizon is often displaced as much as 14′ of arc. One of the most striking examples of displaced horizons occurs in the Red Sea. The hot winds and sands blowing from the deserts create a marked difference between the air and sea water temperatures, and the visible horizon is raised out of all proportion to its true position. As a result the dip is decreased and the resultant true altitude is often as much as 18′ greater than that obtained by using the ordinary dip table.

During the past three or four concentrations of the fleet at Panama, the navigation of our ships has been sharply criticized. Let us consider the reasons that caused poor navigation (or rather, poor results) during these maneuvers. There is a general drift current that sets to the north out of the antarctic regions. This current upon striking the shores of the South American continent is divided into two branches. One of these branches, known as the Peruvian, Chilean, or Humboldt current, flows northeast in the direction of Valparaiso conforming somewhat to the coast lines of Chile and Peru. Near Cape Blanco the current leaves the coast of America and bears toward the Galapagos Islands. This current is exceedingly cold. As an illustration, on one side of Albermarle Island of this group the temperature of the sea was once found to be 80° while on the other side of the same island it was 60°—a difference of 20°. Small wonder that our old friend, the sea horizon, has the "jumps" especially when we consider that these islands are practically on the equator.

It is the writer's belief that this remarkable current has considerable effect on our navigation outside of the Panama Bay area. From the writer's own experience, there have been many days when a heavy mist hung over the horizon in spite of a beautiful sky overhead.

To overcome these difficulties of navigation in regions where this condition exists, whether the horizon can be seen or not, it is recommended that the method to be described be used when possible.

The use of another ship as a horizon is by no means new. It has been described and used on many occasions. However, the writer has compiled a set of convenient tables with which to correct the resultant altitude, thus making such a procedure easy.

The method is simple. The observing ship directs the "target" ship to steam on a course at right angles to the bearing of the heavenly body. The observing ship then steams on a parallel course on the line of bearing of the "target" ship and the heavenly body and at a known distance from the "target" ship. The heavenly body is then brought down to the water line of the "target" ship and corrections from table A and B are applied similar to the method employed in the front of *H. O. Publication No. 208*. Table A contains the correction to be applied for semidiameter, parallax, and refraction in the case of the sun and for the mean refraction in the case of stars. Table B contains the dip to be applied for various heights of eye and for various distances in yards between the two ships. It was computed from the formula

$$\text{dip} = \frac{565h}{d} + .423d$$

where h = height of eye in feet
and d = distance between the ships in nautical miles.

From an inspection of them it will be seen that the lower the height of eye and the further away the "target" or horizon, the less the correction becomes.

TABLE A

OBS. ALT.	SUN'S CORR	STAR'S CORR.
6 30	- 8.3	-7.9
7 00	- 8.8	-7.4
7 30	- 9.2	-7.0
8 00	- 9.6	-6.6
8 30	-10.0	-6.2
40	-10.1	-6.1
50	-10.2	-6.0
9 00	-10.3	-5.9
20	-10.5	-5.7
40	-10.7	-5.5
10 00	-10.8	-5.3
20	-11.0	-5.2
40	-11.2	-5.0
11 00	-11.3	-4.9
30	-11.5	-4.6
12 00	-11.7	-4.5
30	-11.9	-4.3
13 00	-12.0	-4.1
30	-12.2	-4.0
14 00	-12.3	-3.8
15 00	-12.6	-3.6
16 00	-12.8	-3.3
17 00	-13.0	-3.1
18 00	-13.2	-3.0
19 00	-13.4	-2.8
20 00	-13.5	-2.6
22 00	-13.8	-2.4
24 00	-14.0	-2.2
26 00	-14.2	-2.0
28 00	-14.3	-1.8
30 00	-14.5	-1.7
32 00	-14.6	-1.6
34 00	-14.7	-1.4
36 00	-14.8	-1.3
38 00	-14.9	-1.2
40 00	-15.0	-1.2
45 00	-15.2	-1.0
50 00	-15.3	-0.8
55 00	-15.4	-0.7
60 00	-15.5	-0.6
65 00	-15.6	-0.5
70 00	-15.7	-0.4
75 00	-15.8	-0.3
80 00	-15.9	-0.2
85 00	-15.9	-0.1
90 00	-16.0	-0.0

TABLE B

CORRECTION TO BE APPLIED TO THE OBSERVED ALTITUDE OF THE SUN'S LOWER LIMB OR OF A STAR, TO FIND THE TRUE ALTITUDE WHEN ANOTHER SHIP OR THE SHORE IS USED AS A HORIZON.

Ht. eye	DISTANCE OF SHIP USED AS HORIZON IN YARDS											
(feet)	500	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
10	-22.7	-11.5	-6.1	-4.4	-3.7	-3.3	-3.2	-3.1					
11	-25.0	-12.6	-6.6	-4.6	-4.0	-3.5	-3.3	-3.3					
12	-27.3	-13.8	-7.2	-5.2	-4.2	-3.8	-3.6	-3.4	-3.4				
13	-29.5	-14.9	-7.8	-5.5	-4.5	-4.0	-3.7	-3.6	-3.5				
14	-31.8	-16.0	-8.3	-5.9	-4.8	-4.2	-3.9	-3.7	-3.7				
15	-34.0	-17.2	-8.9	-6.3	-5.1	-4.4	-4.1	-3.9	-3.8				
16	-36.3	-18.3	-9.5	-6.7	-5.4	-4.7	-4.3	-4.1	-4.0	-4.0			
17	-38.5	-19.4	-10.0	-7.0	-5.6	-4.9	-4.5	-4.2	-4.1	-4.0			
18	-40.8	-20.6	-10.6	-7.4	-5.9	-5.1	-4.7	-4.4	-4.2	-4.2			
19	-43.0	-21.7	-11.2	-7.8	-6.2	-5.4	-4.8	-4.6	-4.4	-4.3	-4.3		
20	-45.3	-22.8	-11.7	-8.2	-6.5	-5.6	-5.1	-4.7	-4.5	-4.5	-4.4		
21	-47.6	-23.9	-12.3	-8.6	-6.8	-5.8	-5.2	-4.9	-4.7	-4.6	-4.5		
22	-49.8	-25.1	-12.9	-8.9	-7.1	-6.0	-5.4	-5.0	-4.8	-4.7	-4.6		
23	-52.1	-26.2	-13.4	-9.3	-7.3	-6.3	-5.6	-5.2	-4.9	-4.8	-4.7	-4.7	
24	-54.4	-27.4	-14.0	-9.7	-7.6	-6.5	-5.8	-5.4	-5.1	-5.0	-4.9	-4.8	
25	-56.6	-28.5	-14.5	-10.1	-7.9	-6.7	-6.0	-5.5	-5.2	-5.0	-4.9	-4.9	
26	-58.9	-29.6	-15.1	-10.4	-8.2	-6.9	-6.2	-5.7	-5.4	-5.2	-5.1	-5.0	
27	-61.1	-30.7	-15.7	-10.8	-8.5	-7.2	-6.3	-5.8	-5.5	-5.3	-5.2	-5.1	-5.1
28	-63.4	-31.9	-16.3	-11.2	-8.8	-7.4	-6.6	-6.0	-5.7	-5.5	-5.3	-5.2	-5.2
29	-65.6	-33.0	-16.8	-11.6	-9.1	-7.6	-6.7	-6.2	-5.8	-5.5	-5.4	-5.3	-5.3
30	-67.9	-34.1	-17.4	-11.9	-9.3	-7.8	-6.9	-6.3	-5.9	-5.7	-5.5	-5.4	-5.4
31	-70.2	-35.2	-17.9	-12.3	-9.6	-8.1	-7.1	-6.5	-6.1	-5.8	-5.6	-5.5	-5.5
32	-72.5	-36.4	-18.5	-12.7	-10.0	-8.3	-7.3	-6.7	-6.2	-6.0	-5.8	-5.7	-5.6
33	-74.7	-37.5	-19.1	-13.1	-10.2	-8.5	-7.5	-6.8	-6.3	-6.1	-5.8	-5.7	-5.6
34	-76.9	-38.6	-19.6	-13.5	-10.5	-8.7	-7.7	-7.0	-6.5	-6.2	-6.0	-5.8	-5.7
35	-79.2	-39.8	-20.2	-13.8	-10.8	-9.0	-7.8	-7.1	-6.6	-6.3	-6.1	-5.9	-5.8
36	-81.5	-40.9	-20.8	-14.2	-11.0	-9.2	-8.1	-7.3	-6.8	-6.4	-6.2	-6.1	-6.0
37	-83.7	-42.0	-21.3	-14.6	-11.3	-9.4	-8.2	-7.4	-6.9	-6.6	-6.3	-6.1	-6.0
38	-86.0	-43.2	-21.9	-15.0	-11.6	-9.6	-8.4	-7.6	-7.1	-6.7	-6.4	-6.2	-6.1
39	-88.2	-44.3	-22.5	-15.3	-11.9	-9.9	-8.6	-7.8	-7.2	-6.8	-6.5	-6.3	-6.2
40	-90.6	-45.5	-23.0	-15.7	-12.2	-10.1	-8.8	-8.0	-7.4	-7.0	-6.7	-6.5	-6.3
41	-92.8	-46.5	-23.6	-16.1	-12.4	-10.3	-9.0	-8.1	-7.5	-7.1	-6.8	-6.5	-6.4
42	-95.0	-47.7	-24.2	-16.5	-12.7	-10.6	-9.2	-8.2	-7.6	-7.2	-6.9	-6.6	-6.5
43	-97.3	-48.8	-24.7	-16.8	-13.0	-10.8	-9.4	-8.4	-7.8	-7.3	-7.0	-6.7	-6.6
44	-99.6	-50.0	-25.3	-17.2	-13.3	-11.0	-9.6	-8.6	-7.9	-7.5	-7.2	-6.9	-6.7
45	-101.8	-51.1	-25.8	-17.6	-13.6	-11.2	-9.7	-8.7	-8.0	-7.6	-7.2	-7.0	-6.8
46	-104.1	-52.2	-26.4	-18.0	-13.9	-11.5	-9.9	-8.9	-8.2	-7.7	-7.3	-7.1	-6.9
47	-106.3	-53.3	-27.0	-18.4	-14.1	-11.7	-10.1	-9.0	-8.3	-7.8	-7.4	-7.2	-7.0
48	-108.7	-54.5	-27.6	-18.7	-14.4	-11.9	-10.3	-9.3	-8.5	-8.0	-7.6	-7.3	-7.1
49	-110.8	-55.6	-28.1	-19.1	-14.7	-12.1	-10.5	-9.4	-8.6	-8.1	-7.7	-7.4	-7.2
50	-113.1	-56.7	-28.7	-19.5	-15.0	-12.4	-10.7	-9.5	-8.7	-8.2	-7.8	-7.5	-7.2
51	-115.4	-57.8	-29.2	-19.9	-15.3	-12.6	-10.9	-9.7	-8.9	-8.3	-7.9	-7.6	-7.3
52	-117.6	-59.0	-29.8	-20.2	-15.6	-12.8	-11.0	-9.9	-9.0	-8.4	-8.0	-7.7	-7.4
53	-119.9	-60.1	-30.4	-20.6	-15.8	-13.0	-11.2	-10.0	-9.2	-8.6	-8.1	-7.8	-7.5
54	-122.1	-61.2	-30.9	-21.0	-16.1	-13.3	-11.4	-10.2	-9.3	-8.7	-8.2	-7.9	-7.6
55	-124.4	-62.4	-31.5	-21.4	-16.4	-13.5	-11.6	-10.3	-9.5	-8.8	-8.3	-8.0	-7.7
60	-135.7	-68.0	-34.3	-23.2	-17.8	-14.6	-12.6	-11.2	-10.2	-9.4	-8.9	-8.5	-8.2
65	-147.0	-73.7	-37.1	-25.1	-19.2	-15.7	-13.5	-11.9	-10.9	-10.1	-9.5	-9.0	-8.7
70	-158.3	-79.3	-40.0	-27.0	-20.7	-16.9	-14.4	-12.8	-11.2	-10.7	-10.0	-9.5	-9.1
75	-169.6	-85.0	-42.8	-28.9	-22.1	-18.0	-15.4	-13.6	-11.9	-11.3	-10.6	-10.0	-9.6
80	-180.9	-90.6	-45.6	-30.8	-23.5	-19.1	-16.3	-14.4	-13.0	-12.0	-11.2	-10.6	-10.1
85	-192.2	-96.3	-48.4	-32.7	-24.9	-20.3	-17.3	-15.1	-13.7	-12.6	-11.7	-11.1	-10.5
90	-203.5	-101.9	-51.3	-34.6	-26.3	-21.4	-18.2	-16.0	-14.4	-13.2	-12.3	-11.6	-11.0
95	-214.8	-107.6	-54.1	-36.4	-27.7	-22.5	-19.2	-16.8	-15.1	-13.8	-12.9	-12.1	-11.5
100	-226.1	-113.2	-56.9	-38.3	-29.1	-23.7	-20.1	-17.6	-15.8	-14.5	-13.4	-12.6	-12.0

ADDITIONAL CORRECTION FOR SUN'S ALTITUDE

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
+'.3	+'.2	+'.2	-'.1	-'.2	-'.2	-'.2	-'.2	-'.1	+'.1	+'.2	+.'3

THE METAMORPHOSIS OF THE "MERRIMAC"

By Rear Admiral Elliot Snow (C.C.), U. S. Navy (Retired)

Behold the fate of sublunary things
She armor wears, who once outspread her wings!

BEFORE proceeding with the theme of this article, it would be well, perhaps, to apologize to Dr. Mackenzie for having paraphrased the verses written by him about the Dutch yacht *Princess Mary*. It was in this kingly craft that Prince William made his voyage from Holland to England near the end of the seventeenth century. In time she descended in scale from a royal pleasure craft to a British transport during the Crimean War, and then to coal carrier and as if to hide her shame, changed her name to the *Betsy Cairus*. The original verses run:

Behold the fate of sublunary things
She exports coal, who once imported kings.

The biography of ships, writing of them in a personified way, shows many curious phases of career and changes of physical aspect. For instance, the clipper ship *Nightingale* built to carry passengers in luxury to the exposition in London in the early fifties, was diverted very soon afterward because of the discovery of gold to the passenger and freighting trade to California. She then became a slave-trading vessel, flying the Brazilian flag, and after her capture by one of our naval vessels, she performed service on the blockade during the Civil War. Ultimately she was abandoned at sea in 1893 while under the Norwegian flag.

Changes in the physical aspect of ships are common. "Old Ironsides," had she been a bit more staunch, in 1870, would have been converted into a steam frigate. This project was given serious consideration, but was abandoned because of lack of strength. In the World War, many an innocent looking "Q-Ship" disguised its deadly purpose with ordinary-looking deck houses, old rigs, and the like. Their gallant crews and officers resembled in every way the veriest tramps of the sea. No ship, not even the "razees" of the Civil War, ever underwent such a complete metamorphosis as did that fine steam frigate *Merrimac* after her capture and salvage by the Navy of the Confederate States. The steam frigate *Merrimac*, having been scuttled and burned by the naval forces on abandonment of the Norfolk Navy Yard, April 20, 1861, was converted by the Southern States Navy into an ironclad ram. After conversion she, too, had her name changed, and became the C.S.S. *Virginia*. The terrific combat in Hampton Roads, March 9, 1862, between the *Merrimac* (10 guns), in her new disguise as an armored vessel, and the little "cheese-box-on-a-raft," *Monitor* (2 guns), has been pictured and written so many times it will form no part of this article. This engagement was but little more than two weeks old when Currier and Ives published a lithograph that depicted the event which revolutionized naval construction and soon brought "the present backbone" of our fleets into being.

Let us see now what Americans thought of our U. S. steam frigate *Merrimac* when she was launched and fitted out and what Englishmen said of her when she appeared in the Thames; before her white wings were singed and scorched by the flames of the Civil War, before she donned her beetle-like steel carapace and joined the enemy's naval force. Her principal dimensions, battery, and engine power can be had almost anywhere but not so the account of her launching and visit to England which "created quite a flutter among the naval gentry of Great Britain."

The launching of the U. S. steam frigate *Merrimac* was witnessed at the Navy Yard, Charlestown, Massachusetts, on June 14, 1855, "by at least 20,000 visitors" and took place from the first ship house built, at what today is known as the U. S. Navy Yard, Boston. An illustrated account of this event was published on July 14, 1855, in one of the leading pictorial weeklies of Boston.

It was a magnificent spectacle, and not an accident occurred to mar the pleasure of the multitude who gazed upon it. All the bridges, shores,

wharves, shipping, housetops, from which a view of the scene could be obtained, were thronged with people, while hundreds of sail and rowboats, crowded to the utmost capacity, covered the water. Many hundreds of ladies and gentlemen were stationed on the line-of-battle ships *Ohio* and *Vermont*, the latter of which we remember seeing launched a few years since. As the time approached for the first rush of the leviathan into the element she is destined to ride for many years, we trust, the excitement was breathless, and a delay of some minutes seemed an age. All eyes were riveted on the dim-discerned hull. At last a universal shout of "Here she comes!" followed instantly by the crash of cannon, announced that she had left her cradle. With cheer on cheer, mingling with the roar of the guns, she glided forward to the water like a Naiad, and took her first bath. All anxiety as to her performance was immediately dispelled as she rode onward, light and graceful as a swan. Her exquisite symmetry and beautiful proportion rendered it too difficult to realize her size (4,000 tons), till the eye made a comparison with adjacent craft. The *Merrimack* is the first of a fleet of six steam frigates ordered to be built, and if the remainder of them are equal to her, we shall, at last, have something like a steam navy. The utmost alacrity has been displayed in building her, and the mechanics employed on her have reason to be proud of their handiwork. The model was furnished by Mr. Lenthall, chief of the bureau of construction, and she has been built under the superintendence of Como. Gregory, and by the direction of Mr. Delano, naval constructor of the Charlestown navy yard, and Mr. Melvin Simmons, master carpenter. The keel was laid one year since. She is now to be fitted for the service with the utmost despatch, and the only delay likely to occur will be in the casting of the guns, at Alger's foundry—a very nice as well as tedious process. When the *Merrimack* and her sister steam frigates are once equipped and fairly afloat, bearing aloft the stars and stripes, we shall have no reason to be ashamed of our steam navy. This squadron will form a nucleus, at least, around which, in time of need, may be gathered, as circumstances warrant the addition, a formidable fleet of ships, independent of wind and tide.

Thus did the *Merrimac*, as she slid into the waters of Boston Harbor, show that the time had come when we could challenge the skill and ability of the shipbuilders of France and England and overtake them when necessary. Alas, however, she was destined to ride in her element but a few short years when Mars, the Great Wizard of War Imagination, stepped in and decreed—"Fold thy wings away forever. I must have new tools with which to ply my trade on the sea."

The London *Times* wrote a "thundering editorial" on the *Merrimac* whose appearance in English waters made quite as great an impression as did the merchant clipper ship *Great Republic*, born of the brain and fashioned by the hand of Donald McKay. The comment on America's steam frigate ran thus:

Those intelligent Yankees who would "whip creation" know at least how to build a steam frigate. They have just sent us one to look at, the *Merrimack*, a screw steamer of 3,500 tons, 500 horse power, and carrying forty guns of the heaviest caliber. She is one of the six frigates recently built, and of the same class, or probably smaller, than the twelve recently laid down for building. The *Merrimack*, on her arrival, made for the neighborhood of Spithead, so as to give our dockyard and naval authorities an opportunity of inspecting the style of vessels which would have "chawed" up some of our eighty-fours on the West India station, had impolicy or accident precipitated us into a war. Now there are not many, if there are any, vessels in the British Navy, of the same class, a match for the *Merrimack*. The royal dockyards, if they are not behind the age in shipbuilding, are certainly not in advance of it. Our surveyors general seem to possess only the imitative talent of a Chinaman. They originate nothing. It is only when every private shipowner and every foreign power that owns a bumboat, has adopted a new discovery or improved an old one, that we take it up, content to follow in the rear, when we ought to lead the van. This is bad shipbuilding policy for a great naval power. If our navy afloat be large or small, it should be the most powerful and efficient of its kind. We trust that the *Merrimack* may stimulate the energies of our present surveyor-general. He has just been made a K.C.B. for doing nothing he can boast of; let him now set to work and promote such plans as will place our steam-frigate navy individually upon an equality with, if not pre-eminently over, the vessels of every other power. A recent writer in England, speaking of this country, remarks "the fact that there is such intense application of American ingenuity in the manufacture of fire-arms, proves, we think, that there is a strong tendency to military ambition in the American mind." It is acknowledged that, during the war of 1812, the superior skill of the American gunners, their quickness in firing, and the accuracy with which they served their guns, was the secret of many a naval triumph over equal or superior forces. In the Revolutionary War the fatal accuracy of aim on the part of the Americans, and the larger number killed among the British, even when the American forces were inferior in number, illustrates the same thing. The American people have been called a nation of "sharpshooters," and justly, for from boyhood to manhood, not only in the West and South, but in New England, Americans handle guns and become practised shooters. If to this we add the superiority of Americans in the manufacture of fire-arms—a superiority acknowledged by the purchase of arms by foreign nations, and the adoption of our modes of manufacture and our improvements in England; and consider the extent to which the government and individuals are concerned in the manufacture of arms, while there is no impending war, but the prospect of permanent peace, there is reason for the remark quoted above, that there is in the American mind a taste for military af-

fairs. Their ships of war always attract attention for the superiority of their architecture, their force and their management, their skill being seen not less in naval armaments, than in small arms designed for the hands of the people. The steam-frigate *Merrimack* is the smallest and most inferior of the six steam-frigates recently added to their navy, and yet it is admitted by our authorities that it is able to cope with any English steam-frigate or line-of-battle ship in the British Navy.

In a brief five years, the frigate thus highly admired and greatly praised, was lying on the bottom at her berth at the Navy Yard, Norfolk, a scuttled ruin; no longer with tall and graceful spars; her beautiful white wings singed and burned, never to be spread again. But she was soon to rise again, not like a phoenix, for she did not reproduce her kind but in the far more formidable shape of an armored ram. She filled what the Confederate Secretary of the Navy characterized as "a possession of the first necessity," to the states in rebellion. He had written to the Honorable C. M. Conrad, chairman of the Naval Committee of the Confederacy on May 8, 1861:

> I regard the possession of an iron-armored ship as a matter of the first necessity. Such a vessel at this time could traverse the entire coast of the United States, prevent all blockades, and encounter, with a fair prospect of success their entire navy.

And well the C.S.S. *Virginia* might have done this had Ericsson's *Monitor* not stepped into the forefront.

The frigate *Merrimac* was raised at an expense of $6,000, after which it was estimated she could be prepared to contend successfully against the enemy's fleet at a cost of a trifle less than $173,000. The basis of this estimate was that of shielding her "with 3-inch iron placed at such an angle as to render her bullet-proof, and at the same time, arming her with the heaviest of guns, and fitting her with a spur for ramming." Like a bee, she left it sticking in the side of her first victim, the U.S.S. *Cumberland*. When the affairs of the Navy Department of the Confederacy were investigated in 1863, Mr. E. C. Murray, a practical shipbuilder of the South, of twenty years' experience, testified: "I furnished the plan of the *Merimac*, though by some *Jeremy diddling*, it is attributed to Lieutenant Brooke."

It is not a matter of importance to weigh the merits of the claim of Mr. Murray against that of Commander John M. Brooke, C.S.N., to whom the first question asked upon mounting the witness stand, was: "Do you know anything about the origin of the ironclad *Virginia?*" Commander Brooke answered:

"Yes, Sir: I know of her origin because I was concerned in originating the ship."

He then went on to say:

The Secretary and myself had conversed upon the subject of protecting ships with ironclads very frequently, and at last I proposed to him a plan. That was about early in June, 1861, just after the Secretary came here from Montgomery. He approved of the plan, and I asked him to send to Norfolk for some practical shipbuilder, to draw out a plan in detail. He sent for one, and one of the employees of the yard, whose position then I did not know, except that I knew he was not a regular constructor, was sent up. He said he knew nothing of drafting, and although he approved of the general plan, he could not make the drawing. This was what I wanted done chiefly. He was here a few days, and complained of being made sick by the water, and was therefore permitted to return to Norfolk. I then determined to go on with the drawing myself, but asked the Secretary to send for the naval constructor at Norfolk, and naval engineer, so that they might be consulted in relation to the vessel. They came up, and this constructor brought with him a model. I should have said that the name of the constructor was J. L. Porter. This model is now one of the models in the Secretary's room. It consisted of a shield and hull, the extremities of the hull terminating with a shield, forming a sort of box or scow, upon which the shield was supported. The Secretary directed the constructor, Chief Engineer Williamson, and myself to meet him at my office here. We met there, and this model was examined by us all, and the form of the shield was approved. It was considered a good shield and for ordinary purposes, a good boat for harbor defense. The Secretary then called the attention of Mr. Porter and Mr. Williamson to the drawing, giving a general idea of the vessel I proposed. The difference between the model and my drawing consisted in the one I proposed having the ends prolonged and shaped like those of any fast vessel, and in order to protect them from the enemy they were to be submerged two feet under water, so that nothing was to be seen afloat but the shield itself. The object of having these parts of the vessel submerged was to gain speed and to have buoyancy without exposing the hull, and to avoid increasing the draft of water. Mr. Porter and Mr. Williamson, after looking at the drawing, approved of it, and the Secretary directed us to get up a vessel on that plan. Mr. Porter's shield and the one I proposed were almost identical. Mr. Porter, being a draftsman, immediately drew a plan of such a vessel, of comparatively light draft. I think she was to draw something over eight feet of water. Mr. Williamson and myself went to look for engines. We went to the Tredegar Works and inquired there, but there were no suitable engines to be had. Mr. Porter completed the draft, and it is now in my office. Mr. Williamson subsequently stated that the engines of the

Merrimack could be repaired, and made available, but that they could not be used well in any other vessel unless she had equal draft of water, or nearly equal. Mr. Williamson proposed to put the shield on the *Merrimack*. Mr. Porter and myself thought the draft too great, but were, nevertheless, of opinion that it was the best thing that could be done with our means; and Mr. Porter was ordered by the Secretary to Norfolk to make a plan of the vessel, in accordance with the plan which we had approved, and which I mentioned before as having been submitted to the Secretary. Mr. Porter did so. He sent up drawings which were of the same general description as those he made before in accordance with my suggestion. Mr. Porter was directed to perform all the duties of constructor in connection with the alteration of this ship, Mr. Williamson was directed to attend to the engines, and I was directed to attend to having iron prepared in Richmond for her; and the work was then prosecuted with all the energy possible, in my opinion. It was a difficult matter to get iron from Richmond to Norfolk, there being over 700 tons of iron sent down in the course of her construction.

After the vessel was launched, Mr. Porter stated to me that he had accidentally omitted in his calculation some weights which were on board the ship, in consequence of which she did not draw as much water when launched as he anticipated. I suppose that is about all that is required in connection with that ship. The secretary was constantly urging on the parties at the yard to hasten the construction of the vessel. He was of the opinion that vessels of that description would be the most efficient and the most formidable in the world for the purpose for which she was intended.

I wonder what has become of the model of the C.S.S. *Virginia* that one time graced the office of Secretary Mallory!

A plan for the proposed shield for the *Merrimac* was built and tested as the testimony of Commander Brooke shows:

We constructed first a target from a plan proposed for the *Merrimack's* shield. The wood was about twenty-four inches thick; the iron three inches thick, consisting of one-inch plates three deep; the surface target was inclined at an angle of about thirty degrees with the horizon. At a distance of about 300 yards, eight-inch solid shot, with a charge of ten pounds of powder, penetrated the iron and entered five inches into the wood; and this was the case with several shots—some seven or eight. It was then thought proper to increase the thickness to four inches. A new target was constructed, of which the plates were two inches thick, forming two layers. Eight-inch shot, with ten-pound charges and nine-inch shells, weighing about seventy pounds, with ten-pound charges, were fired against the target. The outer plates were shattered, the inner were cracked, but the wood was not visible through the cracks in the plating. The original plan contemplated the first plating described, but this experiment indicated the necessity of increasing the thickness to four inches—which was done. The eleven-inch shot of the *Monitor* would have penetrated the shield of the first description, I think, very readily; but it did not penetrate the four-inch shield in the battle. These were the experiments. I might mention in that connection that I was assisted in making the experiment by Lieutenant Catesby Jones, who was perfectly conversant with everything that relates to ordnance.

The novelty of the hull consisted in submerging the ends, but no experiment was made to determine how it would serve. Four of her guns were rifles, made at the Tredegar Works in Richmond, under Commander Brooke's direction. He says also:

The remainder of her battery were nine-inch shell guns. The rifle guns were intended to throw bolts as well as shells, but owing to the fact that the enemy had no ironclad afloat at the time she first went out, and there being a great pressure upon the works for projectiles of other kinds proper to use against wooden vessels, she was not furnished with bolts. If she had been, the experiment made here with guns of the same caliber show that the turret of the *Monitor* would have been penetrated by them. Everything connected with the ship, except the old hull, was novel, so far as practical application was concerned, and the difficulties were overcome as they presented themselves by consultation, reflection, and study.

The work of reconstructing the U. S. steam frigate *Merrimac* as an ironclad ram was commenced on June 23, 1861, and completed, within a day or two of the time she went to Hampton Roads on March 9, 1862. The C.S.S. *Virginia* by the Confederate order, was destroyed at 5:00 A.M., May 11, 1862, with the idea of obstructing the James River. A third of a century later a similar expedient was attempted by a son of the South in the Spanish-American War at Santiago with a vessel bearing this same name.

VICTUALS, VITAMINS, AND VICTORY

By Lieutenant J. H. Skillman (S.C.), U. S. Navy

There be two things necessary in wars, tactics and cooking. Now the first of these comes in use when the captains speak of their achievements and the historians write of the wars. Tactics is a learned thing and the wars may not be told without it; but while the war rageth and the men be camped upon the foughten field, then it is time for cooking; for many a man that fights the wars, if he hath not his food, were well content to let the enemy live; but feed him, and at once he becometh proud at heart and cannot a-bear the sight of the enemy walking among his tents, but must needs slay him outright. Aye! the cooking for the wars, and when the wars are over you who are learned shall study tactics.—From an old manuscript.

GENERALLY speaking, the rise and fall of a nation parallels that of its man power. Should national emergencies of the future necessitate it, the man power of the nation will probably again be inducted into the military and naval services, some current opinion to the contrary. Therefore, in order that such man power may be used to the fullest possible extent, it must be classified according to physique as well as to trades or vocations. An understanding of the needs of the human body under varying conditions of duty and climate is an essential part of the knowledge which every officer should have. The machinery of life is as technical and as complicated as the machinery of science and less understood by the layman. To some extent this lack of knowledge is a mental stabilizer, for there are many who, if better informed as to their physical make-up, would be the victims of scores of imaginary ills.

Nothing can destroy more quickly the efficiency of a command than a poor mess. The mental attitude of a crew is influenced to a very great extent by the quality and quantity of food served; especially is this true when other ships in the vicinity are reputed to have excellent messes. However, it is necessary at times to distinguish between a crew dissatisfied with the character of food served and the same crew dissatisfied with general conditions on board and using, as the more tangible excuse, the condi of the general mess. Such a situation d mands rare tact and discrimination on t part of the officers concerned.

The present navy ration and system messing is not a makeshift or a tempora structure. It is not the result of any pa ticular individual's ingenuity. On the co trary, it is the result of years of planni wherein ration components and costs ha played the major part, followed by numer ous changes therein so that the nutritive a pect of the ration might keep pace wi modern research along these lines. We ma say then that the ration is fundamentall sound. Our problem revolves around sto age, preparation, and serving, keeping i mind variety, nutritive value, and cost with the health of the crew the factor o greatest consequence. Some may say tha the cost of ration is the main factor, bu such is not the case where good managemen obtains. Navy rationing has little in common with the system used by the Army. Not only are the ration constituents at variance, bu the organization and administrative features are dissimilar. It appears that at many Army posts the complement is recruited from th immediate vicinity insofar as practicable and an attempt is made to keep these men near their homes throughout their enlist ment. It is not so difficult to administer to the localized tastes of such a group. Such a condition will never obtain in the naval service or in other organizations of such a mobile nature.

Fundamentally, we are a country with a "bread, meat, and potato" diet. Such a diet is faulty, but it does form the basis for a well-balanced ration, rich in calorific value and high in vitamin content. One of the main drawbacks in service messes is the necessity for giving the hardest-worked personnel sufficient food, which, in turn, gives those doing less manual labor a more than sufficient diet. Under the present system of messing this cannot be guarded against, but

the time may not be far away when messes will be arranged according to amount of physical labor performed. The result will be a lower and more uniform ration cost, fewer sick days, and smaller waistlines.

There seems to be a popular fallacy that brain activity requires certain foods, but actual experiments have shown that mental activity does not increase the calorific needs of the body. Most jobs requiring mental activity are desk jobs, and for this reason such individuals should consume less food, particularly during working hours, in order to prevent overburdening of digestive organs and drawing the blood supply away from the brain. Men at hard labor and growing children require more protein than do people of sedentary occupations. The fat component differs widely as between races, the Esquimaux consuming large quantities, the Arab practically none.

It is an observed fact that men with well-kept bodies are generally the more efficient in a command, more exacting, neater in appearance, above average in conduct. This should not be construed to mean that the ordinary run of ship athletes are more efficient. But the majority of men who are chronic trouble makers on board, those who fill the pages of the report book, are usually those with the largest number of days on sick report. Physical, moral, and vocational standards seem to run hand in hand.

The early students of nutrition assumed that the human body was a machine for the combustion of food, acting somewhat like the steam engine. With the steam engine, heat and hence power are produced by the oxidation of fuel. The human body obtains its energy and heat from the oxidation of food. In addition, the body stores a part of the food consumed, mostly in the form of fat. Early authorities believed that as long as certain amounts of protein, fat, and carbohydrates were fed into the human system a normal state of health should result. It is only within the last two decades that these assumptions have been proved partially erroneous. The error was brought out through experiments conducted by feeding animals quantities of purified protein, sugar, etc. The results were such that it was apparent there must be other substances necessary to maintain the normal processes of life. Resultant studies brought out the fact that there was an indefinable and somewhat intangible factor necessarily present or unfortunately lacking in foodstuffs, which for want of a better name became known as the vitamin.

Many of us know something about foodstuffs, that is, we make economical purchases, prorate our ration constituents to give variety, stock our storerooms with the items we consider necessary for a cruise. Then, with a certain amount of satisfaction (in some cases trepidation) we call in the commissary steward and climax the day's work with the laconic "Do your best"—brevity being one of the qualities of an efficient and experienced officer. But in reality, the more important phases of mess management are yet to be done. The first thing to be discarded is the timeworn practice whereby the menu reflects the day of the week. For example, a supply officer of many years' experience stated recently that if he knew where certain commissary stewards were serving he could tell what those particular ships or stations were having for dinner. Other very common weaknesses in modern messes include a lack of sufficient desserts, lack of variety, and a failure to serve proper combinations which appeal to the eye as well as to taste.

In food planning and preparation of menus certain other factors must be considered. First, costs vary with number of men to be served; second, individuality in mess management should be shown; third, meat is always a desired item in any mess where men are being served. This last factor is as necessary from a psychological as from a physiological standpoint.

We hear a great deal of calorific and vitamin value of proteins, carbohydrates, minerals, and fats. It would seem more appropriate and much more understandable to classify foods by their action, i.e., fuel, building, and regulating. The regulating foods are probably the least used, and in some respects are the most desirable. Certainly they play an important part in health. Bulk foods, such as sauerkraut, spinach, lettuce, and whole grain cereals, are examples of regulating foods that bring about better peristaltic action of the intestines and cleanse the system. They tend, also, to irritate the digestive tract to an extent sufficient to promote blood circulation and facilitate the absorption of digestible nutrients.

Personal idiosyncrasies have a bearing

upon the kind and quantity of food required, and upon the methods of preparation. The supervisory officer of any mess should see to it that whims and fads do not take the place of good wholesome food in the proper quantity and variety. There is also a common idea among mess officers that only the best cuts of meat and the fancy grades of canned goods will produce a wholesome and palatable meal of high nutritive content. As a matter of fact, the chuck or round of beef may be just as palatable and nutritious as a good tenderloin. In addition, the grades of extra standard and choice, which are the respective qualities of canned vegetables and canned fruits used in the Navy, suffer in comparison with fancy grades in appearance only, and even this difference is noticeable only to experts.

In the eighteenth century the French government, as a military measure, offered a bounty of 12,000 francs to any one who could improve the method of preserving foods. One Nicholas Appert, a brewer and confectioner, experimented from 1795 to 1810 before he perfected his art to the point where he received the award. Although more than a century has passed since Appert discovered that sealed containers and high-processing temperatures were necessary to preserve food, the art of canning today is not mathematically precise. But it has developed sufficiently to offset the personal prejudice against it, which has little foundation today.

Recent researches have shown conclusively the stability of vitamins in canned foods. Oxidation, more than heat, is the principal cause of vitamin destruction therefore we should expect less destruction when heating is done in hermetically sealed containers, as is the custom in the canning industry. However, no one should infer that raw fresh foods should be dispensed with in the normal diet. In the process of canning, the can, after being filled and sealed, is subjected to a temperature high enough to heat the contents from 190° to 240° in order to kill possible bacteria and still escape caramelization of those products canned in sugar. Upon opening the can and reheating the contents preparatory to serving, there is an additional guaranty that the food will be free from harmful bacteria.

Under normal peace conditions and with modern distribution facilities we should experience little difficulty in maintaining a ration so well balanced as to avoid malnutrition and subsequent deficiency diseases. In fact, the possibilities may seem so remote as to question the necessity of reference to them here. However, scurvy was fairly prevalent during the World War among the armies of Europe, the freedom from that disease in the American forces being attributable to the liberal supply of canned tomatoes. The experiences of the British in the Dardanelles and in Mesopotamia during the World War are very interesting from the standpoint of the faulty diets on which the soldiers had to subsist. The British soldiers, forced to subsist on canned meats, white bread, and other preserved foods, were confronted with a number of outbreaks of beriberi due to the lack of vitamin B. Another interesting outbreak occurred during the World War on the German raider *Kronprinz Wilhelm*. This was a combination of both scurvy and beriberi. The deficiency in the diet was due to a lack of fresh fruits and vegetables. A deficient diet may not terminate in scurvy, beriberi, or pellagra, but it may lower body resistance until the individual is liable to contract any one of the common diseases.

Cooking enhances the nutritive value of food. It is a matter of common experience that well-cooked food is wholesome and appetizing, while the same material badly cooked is unpalatable. Cooking serves three purposes. The first is to change the mechanical condition so that the digestive juices can act upon the food more freely. Heating changes the structure of foods very materially, so that they can be chewed and more easily and thoroughly digested. The second is to make it more appetizing by improving appearance and flavor. Food which is attractive to the taste quickens the flow of saliva and other digestive juices and aids digestion. The third is to kill by heat any disease germs, parasites, or other dangerous organisms. In navy messes the preparation of food requires adequate and continuous supervision on the part of officers administering messes.

Constant use has made us so familiar with our ordinary foods that we seldom realize how complicated they are; yet a thorough understanding of them takes us far, not only in chemistry, but into physics and physiology as well.

Courtesy Rear Admiral Elliot Snow (C.C.), U. S. Navy, Retired. *From Ballou's Pictorial, July 14, 1855*

LAUNCH OF THE UNITED STATES STEAMER *MERRIMAC*, FROM THE NAVY YARD, CHARLESTOWN

Courtesy Bendann Art Gallery, Baltimore

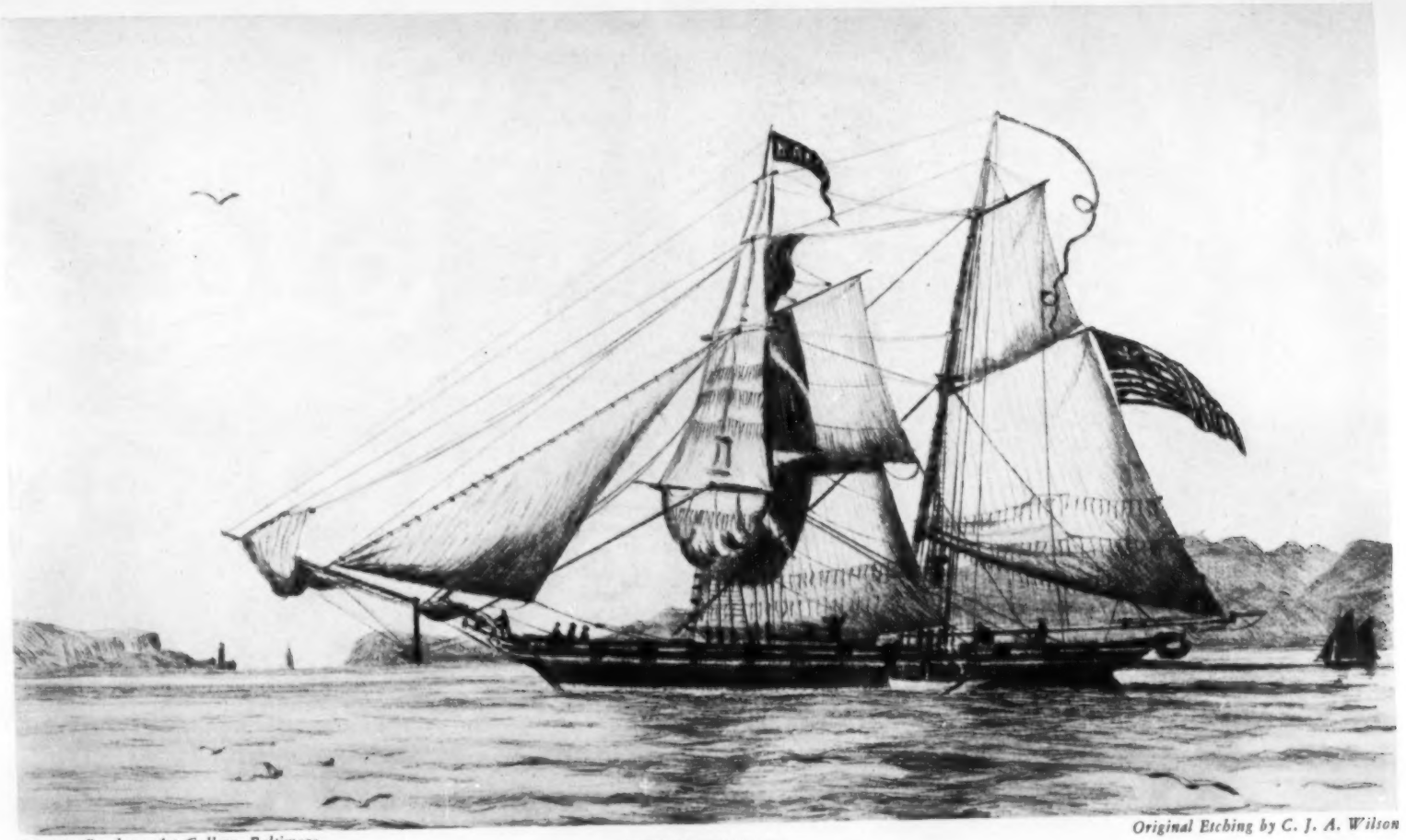
"HEAVE SHORT"

Original Etching by C. J. A. Wilson

Courtesy Bendann Art Gallery, Baltimore

"HEAVE SHORT"

Original Etching by C. J. A. Wilson



Courtesy Bendann Art Gallery, Baltimore

PRIVATE *RAMBLER*

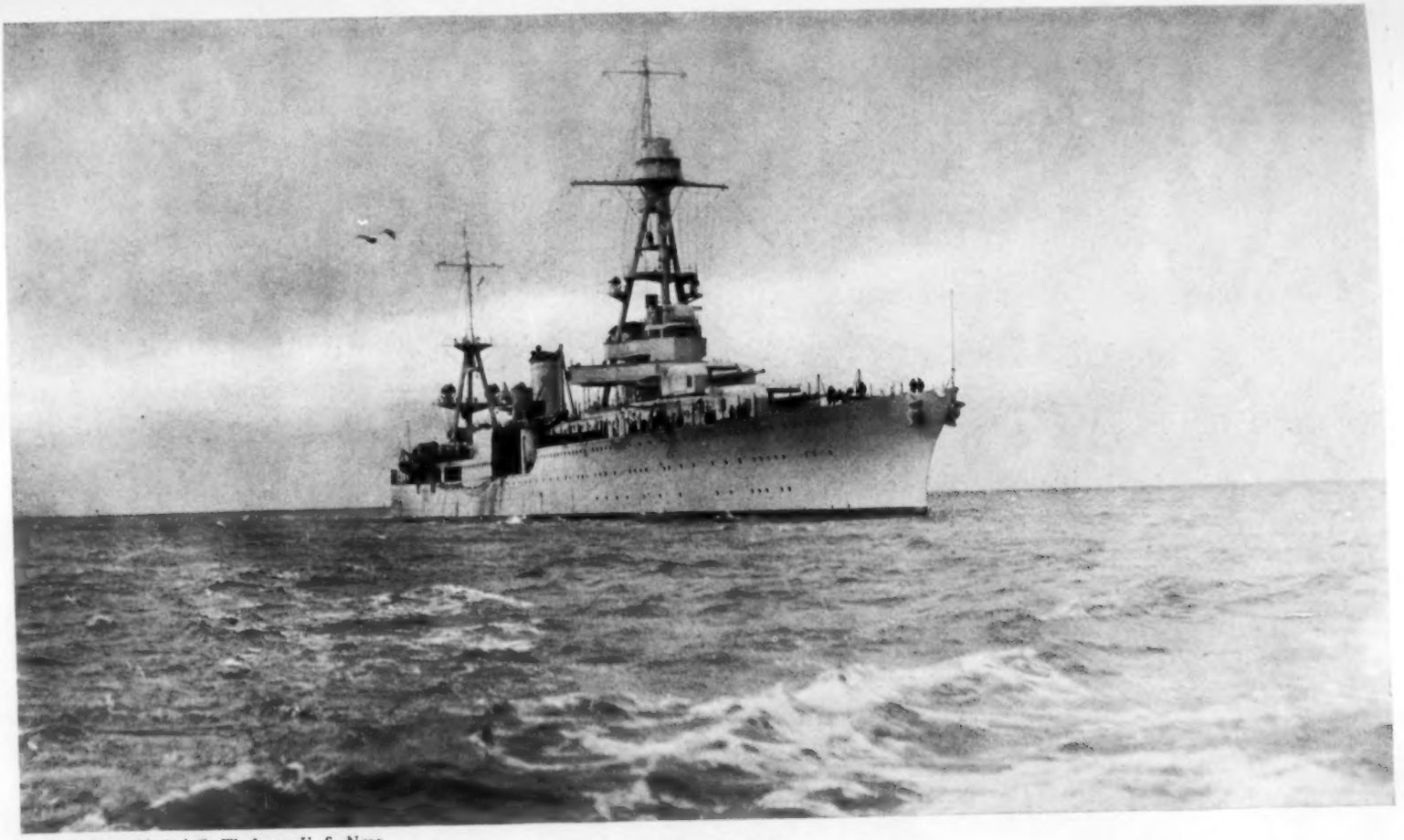
Original Etching by C. J. A. Wilson

Courtesy Constance Lathrop

THE HONMONJI TEMPLE, DUE EAST OF WHICH STANDS THE *ONEIDA* MEMORIAL

Courtesy Constance Lathrop

THE HONMONJI TEMPLE, DUE EAST OF WHICH STANDS THE *ONEIDA* MEMORIAL



Courtesy Rear Admiral G. W. Laws, U. S. Navy

U.S.S. *CHICAGO*

Courtesy Captain F. R. McCrary, U. S. Navy

U.S.S. *OKLAHOMA*

Courtesy Captain F. R. McCrary, U. S. Navy

U.S.S. *NEVADA*

TARGET REPAIR PARTY

Courtesy Navy Recruiting Bureau, New York

NAVAL RESERVE CRUISING

By Lieutenant Commander F. S. M. Harris, U. S. Naval Reserve

THE regular Navy doubtless feels that, like the poor, it ever has the reserve with it. In this truth, doubly true in time of national emergency, we find extenuation for the unending discussions that have found their theme in the relations of the regular and reserve forces and the training problem.

To those whose service dates back to the happy-go-lucky days in the various state naval militias and who have passed successively and successfully through the shifting status of the National Naval Volunteer and the Class Two, Reserve Force, the present orderly policy toward the reserve is a revelation and a satisfaction. The decommissioned destroyers gave the reserve a mission. The destroyer crew as a unit of organization fitted the average reserve fleet division as to numbers and administrative workability. The annual inspection of all units by a regularly constituted board, the gunnery competition, and the insistence upon practice cruising as units tend not only to maintain efficiency, but markedly to advance the standards under which the reserve serves. And finally, the influx of a corps of college trained junior officers, largely technical graduates, from the naval R.O.T.C. schools gives great promise for the future.

With so satisfactory a frame set-up, attention may now be directed toward hanging the detail upon it, and answering some of the fundamental questions which appear for settlement, in agreement with that basic framework. Not the least of these is the determination of the surest and most productive means of making a seagoing sailorman out of a reserve who goes to sea but fifteen days a year.

The subject is as broad as the Navy itself. In the interest of reaching a destination with our discussion, we shall have to limit it to reserve fleet divisions training on destroyers, although much of the argument is equally pertinent to unattached officers cruising on larger ships or doing their trick at office work ashore.

Having a given number of fleet divisions, totaling a given number of officers and men, precisely what is the most profitable employment of the force during its required annual cruising? This question brings into the picture the two types of reserve training cruises now in vogue and injects another major quandary. Shall our reserve spend these valuable days as supplemental complements on regular ships of the fleet or shall they officer and man their own reserve ships, under the supervision and guidance of regular officers detailed as inspector-instructors? Here is the rock upon which U.S.S. "Reserve Policy" breaks up, for every one involved has ideas from a slightly different slant, on the proper handling of the good ship in her distress. Obviously, the evidence is not one-sided for, when all has been threshed over, it will be found that there is "much to be said on both sides."

Plainly and without argument, the purpose of all reserve training is the development of a force of officers and men who can take their places in the fleet or the shore establishments, in time of national emergency with a minimum of delay and a maximum of value. In a day when the first strategical and logistical moves are made before the declaration of war and when the control of the sea is often determined, even predetermined, before the fleet leaves its base, there is no time for recruiting parties and naval tailors and training stations to make ready the reserve force. Under our forced naval economies, there must be an augmented reserve without which the regular service would be fatally crippled in numbers, at least. This then is the yardstick which must be applied fearlessly and without exception, step by step, to each phase of the basic problem. If each partial decision measures closely to this standard, the total policy should not be far in error for, mathematically at any rate, the whole is equal to the sum of all the parts.

As may be anticipated, the observations to be made respecting the training of the offi-

TARGET REPAIR PARTY

Courtesy Navy Recruiting Bureau, New York

cers of the reserve are somewhat different from those regarding the enlisted men. This divergence arises, of course, from the greater difficulty encountered in securing and training officer personnel and the greater responsibility which naturally devolves upon the reserve officer in active duty.

Considering the enlisted reservist first, what are the advantages of his performing his training cruise in a regular ship? As a member of a supplemental crew of a regular ship, he is made to "fleet in" with a corresponding rating in the regular complement. Good or bad, he learns how the duties of his rate are performed in the regular establishment. He steps into a billet in a ship's company that is thoroughly shaken down and working. The first week of his cruise is not wasted in finding himself and in trying to carry on with others who, like himself, are in the throes of a shakedown.

At emergency drills the first day out, some of the regular crew are at hand to carry out the details and to form the nucleus to which the reservist attaches himself. He joins in the work about decks or below with those who know where things are stowed and how tasks are accomplished in acceptable seagoing fashion. The commissary is set up and the messes organized. He finds himself assigned to one of these and becomes a very real part of the ship's company as soon as he has had his first meal with them. In every department, from the bridge to the engineroom, he meets an experienced pattern which, it must be hoped for his welfare, is all that a pattern should be. At any rate he learn his duties precisely in the way that the Navy in time of emergency would insist upon the performance of those duties.

There may be many and other good ways of accomplishing those same duties, but a reservist is more valuable to the Navy, if he knows the Navy way of turning the trick. Above all he breathes an atmosphere of orderly discipline which is painfully lacking, even on the best intentioned reserve vessel; not that the reserve officer is less severe in his insistence on obedience. His discipline is frequently more severe but less effective than that of the regular who is in a position of greater security as regards authority, and has less need of impressing that authority upon his people.

The situation of the reserve officer cruising on a regular ship differs in detail and degree only. He, like all of us, admires ability wherever it is encountered and, particularly, in a specialty in which one is of rather indifferent standing. This very human characteristic finds expression during reserve cruises in the desire of the reservist to make the best possible showing in comparison with the regular of corresponding rank. If he is assigned to a berth in which he is not quite at home, he will buckle down or bone up or do whatever one does to gain proficiency, and he is forever afterwards a better reserve for the experience. He may not admit it to himself, much less to others, but every reservist worthy of his stripes does perform better in competition with regulars in regular ships than he does among fellow-reservists in a reserve ship.

The reserve officer training in a regular ship is exposed to a broader program than he would encounter in a reserve ship. His experience during the two weeks aboard cuts across the work of the Navy as a whole and gives him an insight into many duties and situations which would neither arise nor be apparent on board a reserve ship. Cruising in regular ships offers him the advantage of seeing ships operating in company, a feature generally denied a reserve ship which most commonly cruises solo. Experience in steaming in formation, simple tactical movements, signaling, and guard duty may then be superimposed upon the usual schedule of drills, without overloading it with such work. Competitive inspection of ships and personnel, no less than competitive athletics, build morale and add tremendously to the interest. In time of national emergency, the reserve ship would lose its solo individuality and become submerged for administration and operation, in a division and squadron organization in which this experience would be invaluable and most essential.

The reserve aboard a regular ship absorbs the traditions of the naval service, as he would not in a reserve ship. Shop talk may be proscribed about the wardroom table, but in the informal contacts which are inevitable in the restricted quarters in a destroyer, he rubs elbows with those who are skilled in his avocation, and unconsciously a technical osmosis is set up. Officers from other ships come aboard with their problems, and he hears these discussed. He begins to talk the language. Withal, he makes acquaintances among the officers, many of which carry on through his reserve service with continuing pleasure and helpfulness. The reserve no

longer suspects that he is a land species and somewhat of a curiosity, but begins to feel that he belongs to the ship. And a man who feels that he "belongs," will do his best to merit the belief.

In all modesty, the regular should find something of value in having the reserve in his ship. Few progressive regulars who have had close contact with the reserve force now feel that the reserve is an expensive luxury and an unessential arm of the Navy. The opinion of the regular was not always such, for the simple reason that the reserve force of bygone days was ludicrously different from what it is today. No regular can witness the serious, well-intentioned application of the typical reserve to his duty, without feeling a satisfaction that some of his fellow-countrymen, at least, have recognized the importance of his profession to the nation and are devoting themselves to upholding his hands to the utmost.

What are the disadvantages of training reserves on a regular ship? There are of course drawbacks in reserve training in regular vessels, and they are not all objections from the angle of the reserve, by any means. From the point of view of the regular ship, orders to cruise reservists generally mean just that much more work. The schedules of employment of destroyers of both fleets are very busy-looking sheets of paper with their yard periods, their gunnery and torpedo practices, and their major joint operations. Reserve cruises, of course, mean cruising and commonly take the ships and their regular personnel away from their bases, at what would otherwise be, perhaps, their only open weeks in the year.

The case is known of a destroyer which had reserves on board for cruising during the very weeks last year when the ship's company should have been training for their own short-range battle practice, yet the time of the regular officers and crew was taken up completely with the reserve instruction. On this very ship, the finest feeling prevailed and no gesture was made toward slighting the reserve training in any detail, although at the possible sacrifice of the ship's gunnery standing. To have done one's duty by the reserve is, nevertheless, scant comfort when low scores in gunnery are being posted in the fleet.

In order to berth fifty or sixty enlisted reserves, with the limited accommodations aboard a destroyer, as many of the regular crew as may well be spared are sent away on leave. So far as mere numbers are concerned, their vacancies are more than supplied by reserves but not with equal effectiveness in the matter of ship upkeep. The reserve, no matter how willing or how experienced, is not the equal, man for man, of the regular who knows his ship and has a definite cleaning station and maintenance duties, which he carries on with a minimum of supervision from his officers and section leaders. This, coupled with an aggravated cleaning problem arising from the crowded situation aboard and an unusual amount of time under way at sea, can result only in the ship running down in condition. If the ship finds herself slated for admiral's inspection within a few days after her return to port, the enthusiasm for the reserve, in all its manifestations, fades perceptibly.

The details of ship routine and employment, in its relation to division and squadron organization, must go on uninterruptedly throughout the cruise, even though the ship is away from her unit. This is no small burden in itself under normal operations and with the full complement of officers aboard. It becomes increasingly heavy if two or three officers are absent on leave to make room for the reserve officers in the wardroom.

As a unit of the fleet, the destroyer is naturally involved in engineering and other competitive set-ups, which carry over and through the reserve cruising period and have their influence upon the effective employment of the ship for reserve instruction. If the fuel-oil restrictions hold the ship down to a low but economical speed and limit the amount of steaming allowed for gunnery training, the value of the cruise for reserve experience is diminished precisely to that extent. It would seem narrow policy to cramp the effectiveness of the training, which is all too short at best; far better to refuse orders to a suitable number of reserve officers and to supply those who do go with sufficient fuel for their training. Fortunately, at times the fuel competition is waived or extra oil allowances are made for that purpose; but so long as a destroyer is definitely a part of the fleet organization, she cannot be allowed to step out of character.

From the point of vantage of the reserve, also, there are handicaps in training on a regular ship, imaginary in the minds of some

and very real in others. First of all, the reserve officers and men alike have to sell themselves and their abilities, as it were, to the regular personnel aboard. A certain number of reserve officers with a certain number of stripes and a certain number of men with certain marks on their sleeves come over the side. The attitude of the regular is usually to take these ranks and rates at their face values until they have demonstrated clearly that they cannot be quoted at par. Knowing nothing of the education, experience, or ability of this group abruptly placed under his charge for training, that is all that may be reasonably expected of him.

That some of these reserve officers and men have unusual capabilities along particular lines is not apparent at once, nor can it ordinarily be demonstrated even in a fifteen-day contact. The reservist is more apt than not to be unbalanced in his experience and abilities, and in that respect quite unlike the regular with his well-rounded training acquired from diversified duties and assignments.

The regular officer prides himself in not choosing duty and in holding himself ready for any detail which the day may bring forth. The reserve officer does some things exceptionally well, perhaps; some, not so well; and some, not at all. This diversity of skill may be extremely embarrassing, since the reserve officer, if he is the right sort, is as loath to admit his ability in his better lines as he is to mention his limitations in others. This results in the regular commanding officer having to organize his force in a hit-or-miss fashion. It is not unreasonable that there should frequently be misfits.

There is also the inherent weakness that the regular officers, knowing their regulars by name and reputation, are too apt to call upon their own men for the performance of special and emergency tasks. The reservist, bubbling over with enthusiasm and willingness, may miss the opportunity to jump into the situation, for the simple reason that the order was passed to the regular alongside. There is apparently no ready means of avoiding this situation, for the regular officer, desiring to get something done promptly, leans heavily from mere force of habit upon those whom he knows. All of us would do the same, but meanwhile the reservist has missed a valuable bit of training.

The same is true of the hesitancy of the regular officers to relinquish their responsibility and, consequently, their authority to the reserve officers temporarily on board, particularly the responsibilities of command. Obviously, there can be no division of authority or responsibility. A casualty or a fatality would roost upon the regular's shoulders under all circumstances, even though a reservist were in responsible charge at the time. From personal experience, it must be said that the regular officers have bent every effort to meet this difficulty, through discussing problems and situations with their reservist understudies and inviting suggestions and recommendations. Nevertheless, they properly maintain the right to make the final decision and the reserve commander is never in command.

This retaining of control by the regulars at times carries down to the details of ship's organization. A junior reserve officer may, unwittingly, give an order which completely overturns the standing procedure on the ship. The regular enlisted personnel promptly recognize that the order is contrary to doctrine and go for confirmation to the regular officer from whom they usually take orders. A tense situation develops. In flagrant cases, there has resulted a tacit understanding about the ship that the regular enlisted personnel are not to heed the orders of the reserve officers until the regular officers have seconded the motion, as it were. Such an *impasse* is disastrous to the discipline of both the regular and the reserve complement. Of course, properly schooled reserve officers know the import of orders in which there might be a difference of practice among ships. In case of doubt they inquire first and not only avoid such predicaments but also save their professional dignity.

When the regular ship in which the reserves are training is part of an operating unit of the fleet, the objection is often raised that the fleet routine demands too much attention, and the reserve training too little. Not being allowed to proceed independently, time is wasted in securing permission to do things, in awaiting the movements of other ships of the unit, and in having to do what the rest of the unit is doing. Any remaining time is then available for the special training program. It is also objected that while instruction is being given to one or two officers in ship handling, the rest of the personnel are being neglected. With a proper

schedule of exercises, this lack of attention to the reserve instruction may be obviated to some degree.

The introduction of reserves on a regular ship obviously implies a change in training methods about decks, at the battery, and in the engineering department. It may be claimed that the regular Navy has worked out the best methods of instruction from its long experience in the handling of green men, and that the approved methods should be followed by the reserve. This would be well could the reserve have the benefit of the navy instruction methods throughout the year. To wave aside all that the reserve has been taught throughout the rest of the year just to be "regular" for two weeks out of that year should not be thought desirable, unless the method of reserve instruction is grossly at fault in fundamentals. The enlisted reserve is quite different in type, though not in quality, perhaps, from the enlisted regular. This may go far to justify the instruction methods which the reserve has built for itself.

The last-minute revision of training methods is particularly disastrous in gunnery instruction. Team work at the battery cannot be built anew in a week's training immediately preceding the actual firing for record. This may account for the fact that the naval reserve gunnery trophy for the last two seasons has been won by reserve ships, under the guidance of a particularly capable inspector-instructor who had been able to carry through the year preceding the target practice the same system of training which gun crews were to use on their summer cruise.

Next, what are the advantages of training reserves on board reserve ships? In a reserve ship manned by reservists misfits in detailing for duty do not develop. The reserve commanding officer and his executive are intimately acquainted with the specific abilities and ambitions of each officer and man attached to their unit. Without hesitation they decide that one of their number is to navigate and that another is to be gunnery officer. The section leaders likewise appreciate the peculiarities of their men for specific billets. The organization of the reserve ship may thus be built around the known characteristics of the personnel. If in time of national emergency this tailor-made, specially fitted reserve unit is in fact to report and serve as a unit, no defect is apparent. Such, however, would probably not be the case. If the unit is to be distributed in active duty here and there, to fill all manner of vacancies in the regular establishment, the specialized training of the individuals of such a unit is a very real defect.

This cutting and fitting of duties to personnel, while it results in a better organized ship's company for the moment, only tends further to unbalance the experience of officers and men alike. Patently this is not sound, for the reserve should be encouraged to round out his experience in such a manner as to give him assurance in all the requirements of his rank or rate.

In recognition of the criticism of many that a reservist on board a regular ship does not receive appropriate responsibility, reservists on board a reserve ship carry all the burden that is passed to them, and there are no regulars to share or to monopolize it. The task may not be as well done by the reserve who is singled out for the job, but it is done after a fashion, and the training of the reserve has been advanced by the incident. The next time the duty comes to him his performance will be more skillful.

With the reserve ship away from entangling obligations to flag officers and squadron and division commanders of the regular establishment, schedules of drills and methods of instruction may be drawn closely to meet the requirements essential for training. Only those things need be done which are deemed of advantage to the reserve. The presence of the regular inspector-instructor is of assistance to the reserve commander in making suggestions regarding omissions of desirable exercises and the correction of flagrant errors.

At times a reserve ship is provisionally assigned to a regular unit of the fleet, for purposes of control, but with the "permission granted to proceed on duty assigned." This situation is ideal from the point of view of a limited amount of tactical ship handling in formation, coupled with the opportunity of breaking away from it when it is found to interfere with the other features of the schedule. A regular ship would not have this flexibility which offers the advantage of being able to cruise in the manner which is deemed best for reserve experience and training. If it is desirable, the reserve ship may stand out to sea for navigating work. It is frequently authorized to make a power run at high speed for the in-

struction of the engineering force. It is generally permitted to absent itself from regular bases where the congestion at anchorage and ashore is an unnecessary handicap. None of these special privileges could be had by a regular ship performing its routine duties in its division.

Finally, what of the disadvantages of training reservists on board reserve ships? The reservist in a reserve ship has no one to understudy. The reserve officers, granted that they are trained up to the last detail of navy method, would be insufficient in number to instruct a ship's company of individuals in their individual duties. An officer may correct errors that occur in his presence, but he can know nothing of the many things which are going wrong at the same time in other parts of the ship.

The reserve officers should be too busy learning things on their own part to devote all of their time to the instruction of their men, as trained and experienced regular officers may do for their divisions. This results in the enlisted reservist's shifting for himself, but perchance ineffectively performing anything which he sees to do, with such occasional instruction as may be bestowed upon him by his officers.

The average reservist is full of enthusiasm for the service, else he would not forego his vacation ashore, as he too frequently must, if not his civil job itself, to make the cruise with his fleet division. He is anxious to acquire the tricks of his avocation, but it is an age-old trade in which decades of experimentation have been boiled down in the fires of application. It is an utter waste of human effort for the reservist to reopen and rediscover all this on his own part, for the mere satisfaction of developing his resourcefulness. We are not training Robinson Crusoes who are to exercise their initiative in overcoming obstacles on desert islands, but carefully finished gears which are to turn over noiselessly in a huge and very complicated machine at a time when it is under excessive strain.

Lacking a mentor, the reserve who is worth while will find a way to do the tasks that come to hand, but he is not apt to hit upon the best way, even after several efforts. He will tie some kind of a knot for a given purpose and it may not slip, but if there is a better knot for that purpose, he has missed just that much of the nicety of his adopted trade through not having been told how and what to do.

The objections just raised against reserve training on board reserve ships are minimized in those particular and fortunate instances where the reserve officers are thoroughly trained, and where, as is the growing situation, the reserve division has cruised year after year as a unit, and is thus able to carry over its past year's shakedown to the next year's cruise. These objections are minimized where the reserve unit has a destroyer at its disposal for a week-end cruising throughout the year and can take its summer cruise on board a vessel with which it is acquainted.

There are, of course, many reserve units with veteran chief petty officers and skilled leading men, in which a green recruit can learn a great deal in a short time. It is but human that those who can advocate only reserve training on board reserve vessels should ever feel that they are attached to units of this fortunate type. It would be a happy solution of all of our training problems were every reserve unit of that rare sort. There must inevitably be a tendency of a reservist among reservists to excuse ignorance, to let down on little inefficiencies, and to ignore minor transgressions. It may be nothing more than laxity in relieving the deck or in inspecting the liberty party, but it is such inconsequential factors that pull a ship down in smartness.

Thus we come to the conclusion which might have been anticipated from the start, that there is no one answer that holds under all conditions. The choice between the two training systems depends upon a number of factors which are widely variable among fleet reserve units. Most of us have cruised under both of these systems and have had favorable and unfavorable experiences with both. A strongly officered reserve unit, with well-trained enlisted personnel, summer training on board a reserve ship which it has had for week-end cruising throughout the year will do far better than it will, temporarily, on board a regular ship. A poorly officered reserve unit, with untrained enlisted personnel, by all means needs summer training in a regular ship, particularly where they would otherwise be required to go out in a reserve ship with which they were not acquainted. Inexperienced junior officers, above all others, need cruising in

a regular ship to learn "what it is all about." A tour of battleship duty gives an invaluable background to all officers before they become too enamored of the dungaree navy.

All the evidence points to the value for both strong and weak units, of making available a suitable ship for occasional night drilling and frequent week-end cruising. Aside from the training value which goes far to explain the difference between the strong and the weak, the use of a training ship results in a growing pride in the ship which they nominally possess, a pride which carries over to the summer cruise. Then we shall not have the spectacle of tattooed sailormen hoisting diminutive model whaleboats with string tackles or brawny firemen fiercely stoking pasteboard boilers in some dry-land armory. What would John Paul Jones say to such kindergarten exercises?

In general, the enlisted reservist is relatively less trained and experienced in his rate than is the reserve officer in his rank. Because of this, the enlisted reservist gains more from cruising on board a regular ship. Conversely, the reserve officer probably gains more from a cruise on board a reserve ship, although he needs occasional duty in a regular ship to keep him informed on developments and improvements in navy practice. After all, the training of the reserve officer personnel, because it is the more exacting, should be favored.

The success of either system is dependent absolutely and entirely upon the frame of mind which the reserves and regulars alike hold toward the scheme and toward each other. Reserves in a reserve ship with a regular inspector-instructor can secure training of real value. So can reserves in regular ships with a complement of regular officers and men aboard. The coördination of effort and the coöperation of spirit are the essentials.

The reserve must remember that he is following the Navy as an avocation and, at best, is devoting but a few days out of a busy year to playing at a very exacting profession. Men who were specifically educated for that profession and whose life work it is must be accepted as knowing more of its intricacies than an enthusiastic amateur. While he is in the rôle, the reservist must forget his position ashore and must do his bit to fit himself into his station in the reserve force.

The regular, must remember also, that the reservist is not a regular and, therefore, must not be expected to exhibit the full degree of skill which the Navy rightfully demands of the corresponding rank and rate in the regular establishment, although the regular should insist upon the highest degree of performance procurable from the reservist.

It is profoundly to be urged that the policy of naval economy shall not be permitted to cripple the reserve force, through unduly withholding training appropriations. With the personnel of the regular establishment shrinking daily, the relative importance of the organized reserve force rises. The personnel of the reserve units should be strengthened by every means practicable. The allotment of petty officers should be somewhat greater than for a unit of similar size in the regular service, if the reserve is to be the nucleus of a greatly expanded force in time of national emergency. Inducements should be kept attractive for the reserve enrollment of former regulars, whether officers or men, and for keeping up an even flow of new entries from civil life and the colleges. With such training expended upon such personnel, should the need ever again arise, there will be ready to come over the side a reserve force worthy of the title.

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THE REQUIREMENTS *of battle are: the will to fight and the means of doing so, an object, a plan, and the desire to win.*—MAILLARD.

DIESEL-ELECTRIC INSTALLATION FOR AUXILIARIES

By Lieutenant Howard E. Orem, U. S. Navy

IT IS not the purpose of this article to delve deeply into the debatable subject of Diesel-electric drive for auxiliary machinery on battleships. However an attempt will be made to correlate some of the data and opinions that have resulted from the past experience of certain engineering personnel.

On the *West Virginia* and *Maryland* were installed, for experimental purposes, two vertical 6-cylinder, single-acting, air-injection, 2-cycle, Busch-Sulzer Diesel engines, designed to develop 950 b.hp. at 350 r.p.m. Each engine is directly connected to a 400-kw., d-c generator, which can supply power to the distribution boards similar to the auxiliary turbo-generators.

That a Diesel-electric plant under many conditions can produce power at less cost than the turbo-generators is generally conceded. But the present-day battleship auxiliary plant has many demands that are not met with volts and amperes, namely, evaporators, galley, laundry, heating system, ice-making, cold storage, etc. Some of these requirements can be and are satisfied by electricity, but at present it is general to supply the first three with steam. The making of approximately 15,000 gallons of fresh water per day requires a considerable heat supply not easily met by electrical power.

The Diesel engines of the *Maryland* are equipped with a water-tube type of waste-heat boiler designed for the dual function of a muffler and source of auxiliary steam. The boiler has not proved satisfactory for either purpose. Engine vibration has made it almost impossible to keep the casing tight and the maximum steam pressure generated has been about six pounds with a very low rate of flow. The faulty casing could be very easily corrected by a change of design; likewise it is believed a much greater boiler efficiency could be gained if means were provided for easy cleaning of the tubes. Exhaust gas temperatures have been found to vary with the load from 450° to 600°F. Since approximately 230 pounds of fuel oil are burned hourly, a considerable heat source is available, but only a fraction of that needed to produce sufficient steam to meet the desired requirements. The waste-heat boiler can be modified to accommodate a Mayflower burner which, together with the exhaust gases, could supply sufficient steam to meet all at-anchor demands during periods of low steam consumption, week-ends, and from taps to reveille. If the ship is equipped with the usual electrical devices—ice machines, pantry-warming and bakery ovens, fresh-water heaters, air heaters, feed and fuel pumps, and other common auxiliaries—the steam demands will be reduced to the requirements of the galley, laundry, pressing shop, air pump, evaporators, and a few smaller units. Then the total steam consumption should be well within the capacity of the proposed boiler. No doubt one of the main boilers with 5,500 square feet of heating surface is operating less efficiently at such low rates, and in addition there is increased radiation loss due to the large surface area. Comparing fuel-oil consumption when operating the Diesel generating set in conjunction with the steam plant and the steam plant alone, after correcting the oil consumption of the two systems of operation for the difference in kilowatt-hour output and gallons of water made, we get approximately 1,600 gallons of fuel used by the Diesel plus steam plant as compared with 2,500 gallons for the steam plant alone, or a saving of about 35 per cent. The figures represent a 16-hour test with almost similar conditions of load for the other operating auxiliaries. Data are not available for making a similar comparison for the operation of the Diesel plant alone, using a waste-heat boiler with a Mayflower burner, but the author is of the opinion that the saving would exceed 15 per cent. However, the vessel employing this type of auxiliary

power supply assumes the necessary hazard of an increased time requirement in making preparations for getting under way. In addition, fuel-oil consumption alone does not give a fair comparison, since the lubricating oil used and repairs required have been found to be higher for the Diesels. The ultimate result, however, affords an appreciable monetary saving when the Diesels are operated in conjunction with a main boiler or alone.

The rules for engineering performances assign a penalty of 0.125 per cent for failure of light and power. Due to the experimental nature of the Diesel engines as installed, this penalty has been justly waived when they are in operation. The department has considered that this work should be conducted with the authorized personnel and all expenditures to be met by the ship's unchanged engineering allotment. For the past several years much interest has been shown by the engineering personnel of the *Maryland* in the Diesel installation, as it afforded the best opportunity for increasing the engineering score. Various problems have been solved and the occasional Diesel failures tended to keep the engine-room and Diesel personnel more alert. The dual installation permits the operation of one set at a time, thus affording the necessary overhaul periods for the idle Diesel engine and various steam units. It is conceivable that during battle auxiliary machinery derangements might be such as to reduce the electrical supply below requirements, thus establishing the military possibilities of the installation. Experience has proved the units to be of real value during dry-docking periods where direct current is not available.

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JUDGED BY HIS RECORD, *no man ever grasped more clearly than Nelson that the object of naval warfare was to control communications, and if he found that he had not a sufficient number of cruisers to exercise that control and to furnish eyes for the battle fleet as well, it was the battle fleet that was made to suffer, and surely this is at least the logical view. Had the French been ready to risk settling the question of the control in a fleet action, it would have been different. He would then have been right to sacrifice the exercise of control for the time in order to make sure that the action should take place and end decisively in his favor. But he knew they were not ready to take such a risk, and he refused to permit a purely defensive attitude on the part of the enemy to delude him from the special function with which he had been charged.*—CORBETT.

WEIR'S AZIMUTH DIAGRAM

SOME ADDITIONAL USES AND A SLIGHT MODIFICATION

By Lieutenant W. L. Maxson, U. S. Navy

IN THESE days of shortened and abbreviated navigation, it is perhaps well to remember that we still have with us our old friend, Captain Weir's Azimuth Diagram. There can be no question that for use aboard ship, where parallel rulers or a universal drafting machine is available, it is the most accurate graphic method yet devised for determining the azimuth of a celestial body, given the latitude, declination, and hour angle.

It is not generally realized, however, that this diagram will give a complete approximate solution of the astronomical triangle, save only in the case where the three sides or the three angles are given, and that from this property it may be made useful in many more ways than solely for finding the azimuth.

Among these various uses may be listed:

(1) Star identification; the diagram has been previously used to find the hour angle of the unknown star or planet, but it can also be used to determine the declination, without any ambiguity whatever as to sign.

(2) To determine the approximate altitude and azimuth of a given body, such as Venus, so that the navigator's sextant may be pre-set, as for taking a planet sight in the day time. Also to find the approximate altitude and azimuth of stars, so that the sextant may be pre-set and thus avoid the necessity of bringing the star down to the horizon.

(3) To determine the time of the sun's crossing the prime vertical, when the sun's declination is of the same name and numerically less than the latitude.

(4) To determine the time that the sun will reach an altitude high enough to take a morning sun sight, or to determine the latest practicable time to take a sun sight in the afternoon.

(5) To determine the great circle course and distance between two points, of which the latitude and longitudes are given, where the distance is at least 1,800 miles; and to lay down on the Mercator chart the great-circle track.

(6) To plot radio bearings on a Mercator chart.

To shorten the labor involved, a slight modification of the Weir diagram seems advisable, which may be made on the present Weir's diagram as issued to the service.

These changes are:

(1) From the equator, *upward*, cross out the figures on the horizon, and for them substitute the bearings continued to 180°. That is, in place of N. 85 E., the new figure would be 95°; in place of N. 80 E., the new figure would be 100°; and so on until the 0° mark at the North point would be 180°.

(2) Then from the North point, write the bearings alongside the others, outside the horizon circle, from 180° at the North point, to 360° at the South point.

(3) Then along the inner side of the horizon mark the bearings in hours and minutes, each degree representing four minutes, and each 15° representing 1 hour from zero hours at the South point to 12 hours at the North point.

What we have done is to mark the horizon in degrees from 0° to 360° and in hours and minutes, from 0^h to 12^h. While the diagram can be used without these changes, they will greatly facilitate its use, as will be evident from what follows. Having made the changes we are ready to proceed.

To find the true azimuth of a celestial body, given the observer's latitude, the declination of the body, and the hour angle (time from crossing the meridian).

(1) From the latitude (on the meridian) follow the ellipse to its point of intersection with the hyperbola of the required hour angle and mark it lightly with a dot and a circle. This may be called the position of the object. (If the hour angle is less than six hours, this intersection will be on the same side of the equator as the latitude; if more than six

hours it will be on the opposite side, as the amount over six hours must be measured beyond the equator to obtain the position of the required hour-angle hyperbola.)

(2) Mark the declination on the meridian. This may be called the position of the observer.

(3) With the parallel rulers or drafting machine, transfer the line joining these two positions to the center of the diagram; the point where the line cuts the graduated horizon is the true bearing, less than 180° if the body bears easterly, more than 180° if the body bears westerly.

It will be noted that it is not necessary to change the signs of the latitude and declination, as in the instructions on the chart. The new marking of the horizon eliminates this, and also gives the bearing in degrees from 0° to 360°, without further computation.

Example 1 (Fig. 1): Latitude 10° N., declination 20° N., hour angle $5^h\ 0^m$ E., required, the azimuth.

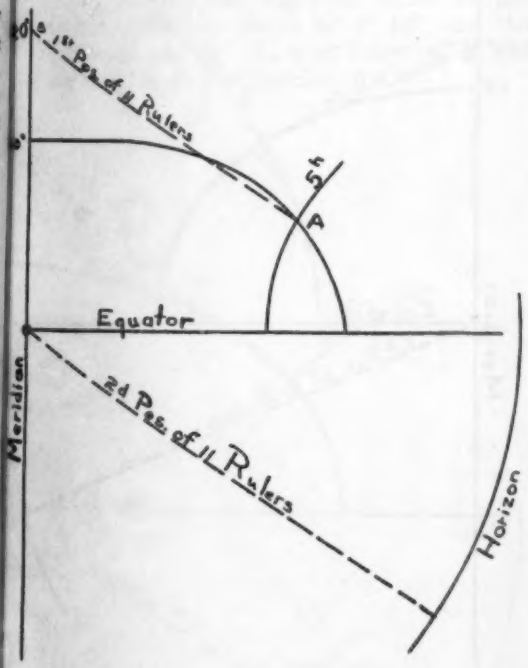


FIG. 1. FINDING AZIMUTH

(1) Find the latitude ellipse, 10° N., on the meridian, and follow it to hour angle 5^h (above the equator), and mark the intersection with a dot and circle. (Point *A*).

(2) Mark the declination 20° N., on the meridian (*B*).

(3) Lay the parallel rulers with the edge through the two dots made (*A* and *B*). Then move the rulers to the center of the diagram, keeping them parallel with this line, and the edge will intersect the horizon at azimuth 72° (because bearing is easterly).

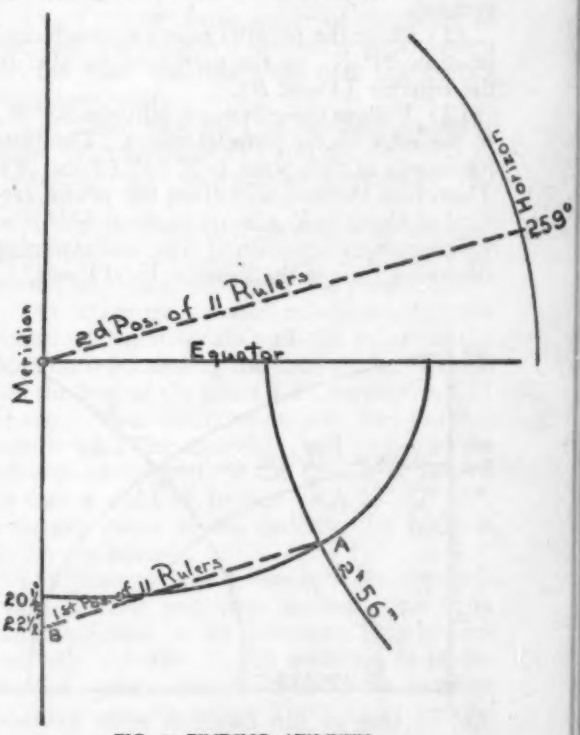


FIG. 2. FINDING AZIMUTH

Example 2 (Fig. 2): Lat. 20.5° S., Dec. 22.5° S., hour angle $2^h\ 56^m$ (W.), required, the azimuth.

(1) Follow lat. ellipse of 20.5° S., to hour-angle hyperbola $2^h\ 56^m$ (south of the equator) and mark the point (*A*).

(2) Mark the declination 22.5° S., on the meridian (*B*).

(3) Lay the parallel rulers with their edge through the two dots made (*A* and *B*), and transfer the line to the center of the diagram. The edge of the parallel rulers will then cut the horizon at azimuth 259° (since the body bears westerly).

To find the time of crossing the prime vertical; when declination of sun is same name and less than the latitude:

(1) Place the parallel rulers through the declination on the meridian keeping them parallel to the equator.

(2) The time hyperbola through the point of intersection of the latitude ellipse with the

edge of the parallel rulers will be the hour angle at the time of crossing the prime vertical.

Example 3 (Fig. 3): Latitude 30° N., declination 20° N., required, the hour angle of the sun at the time of crossing the prime vertical.

(1) Place the parallel rulers through declination 20° N., on the meridian, parallel to the equator (Point *B*).

(2) Follow the ellipse of latitude 30° N., to the edge of the parallel rulers. The time hyperbola at this point is 3h 24m (Point *A*). Therefore the sun will cross the prime vertical at about 8:36 A.M. or at about 3:24 P.M. (disregarding equation of time and assuming that zone time is the same as local time).

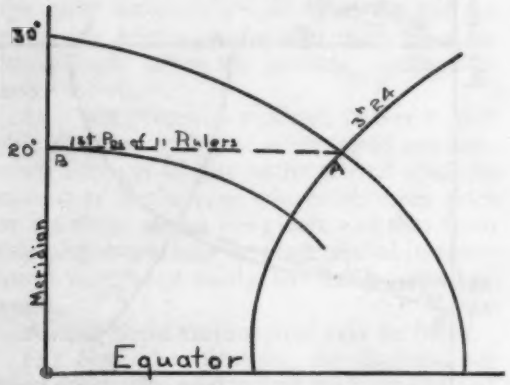


FIG. 3. TIME OF SUN CROSSING PRIME VERTICAL

Given the altitude, azimuth, time of observation, and dead reckoning position: to identify an unknown celestial body:

(1) Along the horizon read the azimuth, converted from degrees into hours and minutes.

(2) Follow the latitude ellipse to the time hyperbola representing the azimuth converted into time. Mark this point lightly with a pencil (*A*).

(3) Mark the altitude of the body on the meridian (*B*).

(4) Place the parallel rulers through the two points marked (*A* and *B*), and transfer them to the center of the diagram. The edge of the rulers will intersect the horizon at the approximate hour angle of the body observed. Record this hour angle.

(5) Follow the latitude ellipse to the time hyperbola representing the hour angle as determined in (4) above. Mark this point (*A*).

(6) Place the parallel rulers through the center of the diagram and the azimuth on the horizon. Transfer them to the point (*A*) determined in (5) above. The point at which the parallel rulers intersect the meridian will be the declination of the unknown body north or south according to whether the point on the meridian is north or south of the equator (Point *B*).

(7) With the hour angle determined in (4) and the declination determined in (6) the name of the star may be determined by any of the standard or abbreviated methods.

Example 4 (Figs. 4a and 4b): Given: observed altitude of unknown body to be 43.5°; azimuth by standard compass 305° (T); dead reckoning position latitude 34°-00 N., longitude 60° W.; local sidereal time 9h 12m; required, the name of the body.

(1) Convert the azimuth 305° (T) to hours and minutes, reading it on the horizon without computation or (—) 3h 40m.

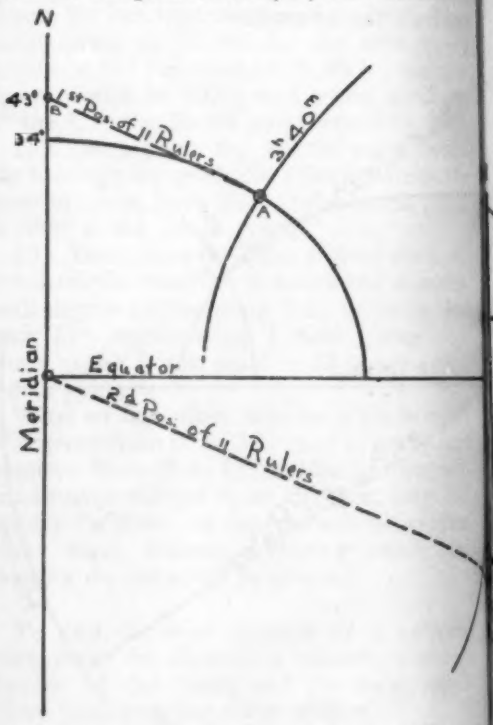


FIG 4 (A). HOUR ANGLE OF UNKNOWN BODY

(2) Follow the latitude ellipse of latitude 34° N., to the time hyperbola of 3h 40m and mark it (*A*).

(3) Mark the altitude 43.5° on the meridian (the altitude always being the same name as the latitude (*B*).

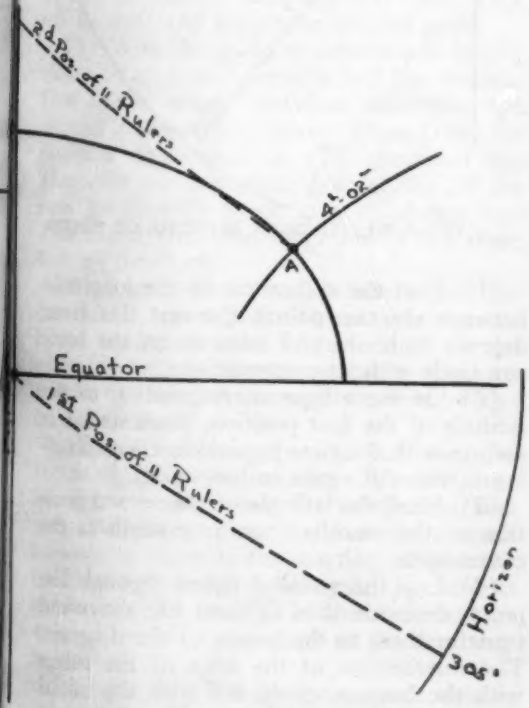
(4) Place the parallel rulers through the two points thus marked (*A* and *B*) and transfer the line to the center of the diagram. The edge of the parallel rulers will intersect the horizon in the hour angle of the body (—) 4ʰ 02ᵐ. This is the hour angle to be combined with the local sidereal time to find the right ascension of the star thus—

LST		9ʰ 12ᵐ
HA (W)	(—)	4ʰ 02ᵐ
RA star		5ʰ 10ᵐ

(5) Follow the ellipse of latitude 34° N. to the time hyperbola 4ʰ 02ᵐ and mark the point (*A*) *(Fig. 4b)*.

(6) Place the parallel rulers through the center of the diagram and the bearing 305° (T) on the horizon. Transfer this line to the point (*A*) marked in (5). The edge of the parallel rulers will intersect the meridian at the point 47° N., which is the declination of the unknown body (*B*).

(7) Having the right ascension as determined in (4) above of 5ʰ 10ᵐ and the declination of 47° N., scan the star list and see that the star is Capella.



4 (B). FINDING DECLINATION OF UNKNOWN BODY

To determine the altitude and true azimuth of a known heavenly body at any given time (given the time of observation, the dead reckoning position, the name of the body and consequently its right ascension and declination):

(1) Find the hour angle of the body at the time it is proposed to observe it, by means of the local sidereal time and the body's right ascension.

(2) Then with the D.R. latitude, the hour angle determined in (1) and the declination, determine the azimuth as previously explained.

(3) Follow the latitude ellipse to the time hyperbola representing the azimuth converted into time, and mark the point (*A*).

(4) Place the parallel rulers through the center of the diagram and the point on the horizon representing the hour angle. Transfer the line to the point (*A*) marked in (3) above. The intersection of the parallel rulers with the meridian will indicate the altitude of the body at the time it is desired to take a sight of Jupiter (RA 12ʰ 57ᵐ 09ˢ, contrary name to the latitude the body is below the horizon.

(5) Having thus determined the approximate altitude and true azimuth, the body may be found in the heavens. This is particularly valuable if, for instance, it is desired to take a planet sight in the daytime to cross with a sun line. The sextant may be set to the approximate altitude, and directed in the proper direction at the proper time, and the navigator should be able to pick up the planet near the horizon with his sextant on a clear day.

Example 5 (Figs. 5a and 5b): It is desired to take a sight of Jupiter, (RA 12ʰ 57ᵐ 09ˢ, dec. 4° 51′ 1″) at watch time 7ʰ 17ᵐ 40ˢ. The LST is determined to be 16ʰ 40ᵐ 59.1ˢ and consequently the hour angle is 3ʰ 33ᵐ 50.1ˢ. lat. 25.5° N., long. 47° W., required, the approximate altitude and azimuth.

(1) Follow the ellipse of latitude 25.5° N., to the hour-angle hyperbola 3ʰ 34ᵐ. Mark this point (*A*) (Fig. 5a).

(2) Mark the declination of Jupiter 4.9° S., on the meridian (*B*).

(3) Place the parallel rulers through the points marked (*A* and *B*). Transfer the line to the center of the diagram and the azimuth will be read on the horizon 247° or 7ʰ 30ᵐ.

(4) Follow the latitude ellipse of latitude 25.5° N., to the time hyperbola 7ʰ 30ᵐ (be-

low the equator) and mark the point (*A*) (Fig. 5b).

(5) Then place the parallel rulers through the center of the diagram and the point on the horizon representing the hour angle (3ʰ 34ᵐ). Transfer this line to the point previously marked (*A*) in (4) above. The point (*B*) at which the parallel rulers intersect the meridian indicates the required altitude of Jupiter 29.8°. (This was later calculated and found to be 29° 58′ so the result was remarkably close.)

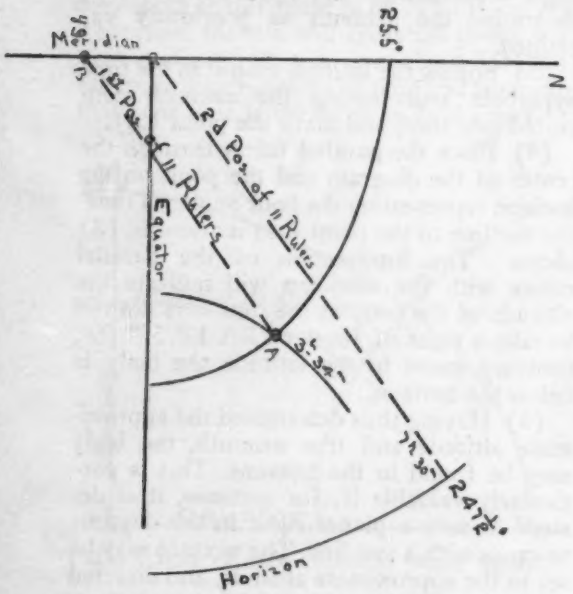


FIG. 5 (A). FINDING AZIMUTH OF JUPITER

To find the approximate time at which the sun will reach an altitude sufficient to take a sight in the morning, or the latest time practicable to take a sight in the afternoon (given the dead-reckoning position and approximate declination of the sun):

(1) Assume an altitude at which the sight is to be taken, say 15°.

(2) From the Weir diagram or by other means determine the time of sunrise.

(3) With an hour angle one-half hour later than sunrise and the given latitude and declination, determine the azimuth, as explained above, and the altitude.

(4) Then if the sun changes from 0° to the altitude obtained in (3) in half an hour, by a rough interpolation it is possible to find the approximate hour angle at which it will reach an altitude say, 15°. The process for determining the altitude near sunset is exactly the same except that the time of sunset is used, instead of the time of sunrise. This is a rough method but it is sufficiently accurate for ordinary purposes.

To find the great circle course and distance between two points not less than 1,800 miles apart, given the positions of the two points:

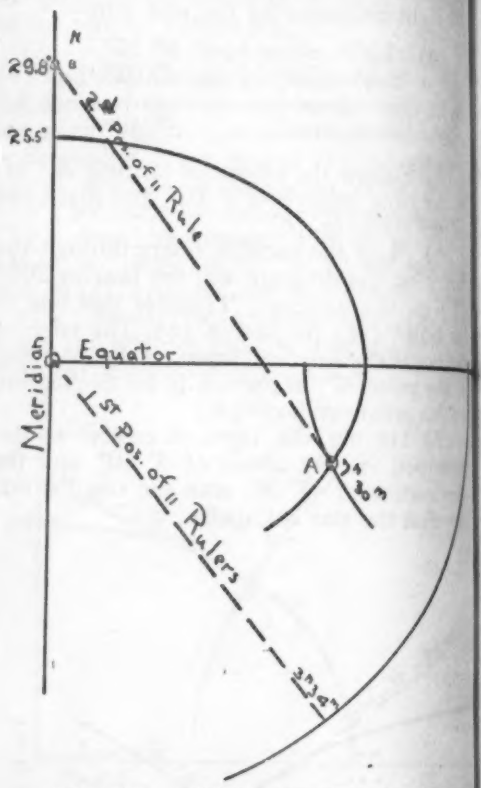


FIG. 5 (B). FINDING ALTITUDE OF JUPITER

(1) Find the difference in the longitude between the two points. Convert this from degrees to hours and minutes on the horizon circle without computation.

(2) On the ellipse corresponding to the latitude of the first position, mark its intersection with the time hyperbola corresponding to the difference in longitude.

(3) Mark the latitude of the second position on the meridian north or south as the case may be.

(4) Lay the parallel rulers through the points determined in (2) and (3) above and transfer them to the center of the diagram. The intersection of the edge of the rulers with the horizon circle will give the initial great-circle course. Read this course in degrees and also in hours and minutes.

(5) Follow the latitude ellipse of the first point to its intersection with the time hyperbola corresponding to the great-circle course and mark the point.

(6) Lay the parallel rulers through the center of the diagram and the point representing the difference of the longitude on the horizon. Transfer this line to the point marked in (4) above. The edge of the parallel rulers will then intersect the meridian at the point representing the complement of the great-circle distance in degrees. Subtract the reading on the meridian obtained in (5) from 90° and multiply the result by 60, to obtain the great-circle distance in miles.

Advantage may be taken of this method to lay down a great-circle track between any two positions on a Mercator chart, without the use of a great-circle sailing chart, and with practically as much facility as with one of those charts as follows:

(1) Determine the initial great-circle course as explained above (the distance being unnecessary).

(2) From the latitude and longitude of the initial point on a position-plotting sheet lay off on the initial course a distance equal to any convenient unit, say 200 miles. Pick off latitude and longitude of this point.

(3) With the position determined in (2) above as an initial position and the destination as the second position, determine the second great-circle course. Then from the position determined in (2) above on the Mercator position-plotting sheet, lay off the new great-circle track to a third position. Pick the latitude and longitude of this position off the chart.

(4) Repeat the above procedure until the destination is reached. The complete great-circle track will now be laid down on the position-plotting sheets, and the distance will be equal to the sum of the several legs of the course.

(5) If the limiting parallel has been determined upon, the procedure is exactly the same except that when the limiting parallel is reached start at the destination and work backwards towards the starting point until the limiting parallel is reached. The course on the limiting parallel is of course east or west on the Mercator chart as the case may be.

Example 6: Find the great-circle course and distance between San Francisco and Honolulu.

San Francisco Lat. 37° 47′ 30″ N. Long. 122° 27′ 49″ W.

Honolulu Lat. 21° 17′ 57″ N. Long. 157° 51′ 34″ W.

Lat. 37° 47′ 30″ N.	Long. 122° 27′ 49″ W.	
Lat. 21° 17′ 57″ N.	Long. 157° 51′ 34″ W.	
Difference		35° 23′ 45″ W.

(2) Find the hours and minutes on the horizon corresponding to 35.4° or $2^h\ 22^m$.

(3) Follow the latitude ellipse 37.8° N. to the time hyperbola $2^h\ 22^m$ N., and mark the point (*A*).

(4) Mark the latitude of Honolulu 21.3° on the meridian (*B*).

(5) Transfer the rulers to the center of the diagram and read the initial course 252° or $7^h\ 11^m$.

(6) Follow the latitude ellipse of San Francisco 37.8° N., to the time hyperbola of the great-circle course $7^h\ 11^m$ and mark it (*A*).

(7) Place the parallel rulers through the center of the diagram and the point on the horizon representing the difference of longitude $2^h\ 22^m$ N.

(8) Transfer the rulers to point marked (*A*) in (6). The edge of the parallel rulers will pass through the point 55.5° N. The complement of this is 34.5°. 34.5 × 60 equals 2,070, the great-circle distance between San Francisco and Honolulu.

To lay off the great-circle track between San Francisco and Honolulu.

(1) From Lat. 34° 47′ 30″ N., Long. 122° 27′ 49″ W., a rhumb-line distance of 300 miles on course 252° will put the ship in Lat. 36° 14.8′ N., Long. 128° 25′ W.

(2) From this position the great-circle course to Honolulu as determined from the diagram is 248°. Laying off 300 miles on the position-plotting sheet from Lat. 36° 14.8′ N., Long. 128° 25′ W., on course 248° we get the position at the end of the second leg Lat. 34° 22.2′ N., Long. 134° 06.3′ W.

(3) From the position determined in (2) above determine the next great-circle course as before to be 244°. Laying off 300 miles along this course from the last position gives the position at the end of this leg, Lat. 32° 10.7′ N., Long. 139° 28.8′ W.

(4) Determine the next course 240°, by means of the diagram and plot the next

position on the plotting sheet, Lat. 29° 40.7′ N., Long. 144° 31.9′ W.

(5) Determine the next course 238° by means of the diagram and the next position on the plotting sheet, Lat. 27° 01.7′ N., Long. 149° 21′ W.

(6) Determine the next course 235° and the next position, Lat. 24° 09.6′ N., Long. 153° 54.3′ W.

(7) From the last point, as it is close to Honolulu, lay off a rhumb-line course 232°, distance 278 miles, into Honolulu.

(8) Adding the various legs of the course, we find them to total 2,078 or very nearly equal to the great-circle distance between the two points, as calculated, 2,076 miles.

(9) What we have done in the foregoing is to head directly for the port of destination at the time of beginning each of several rhumb-line courses. At the end of each leg of the course, we are slightly to northward of the true great-circle track, but the error is negligible even with legs as long as those taken, 300 miles, and courses taken only to nearest whole degree.

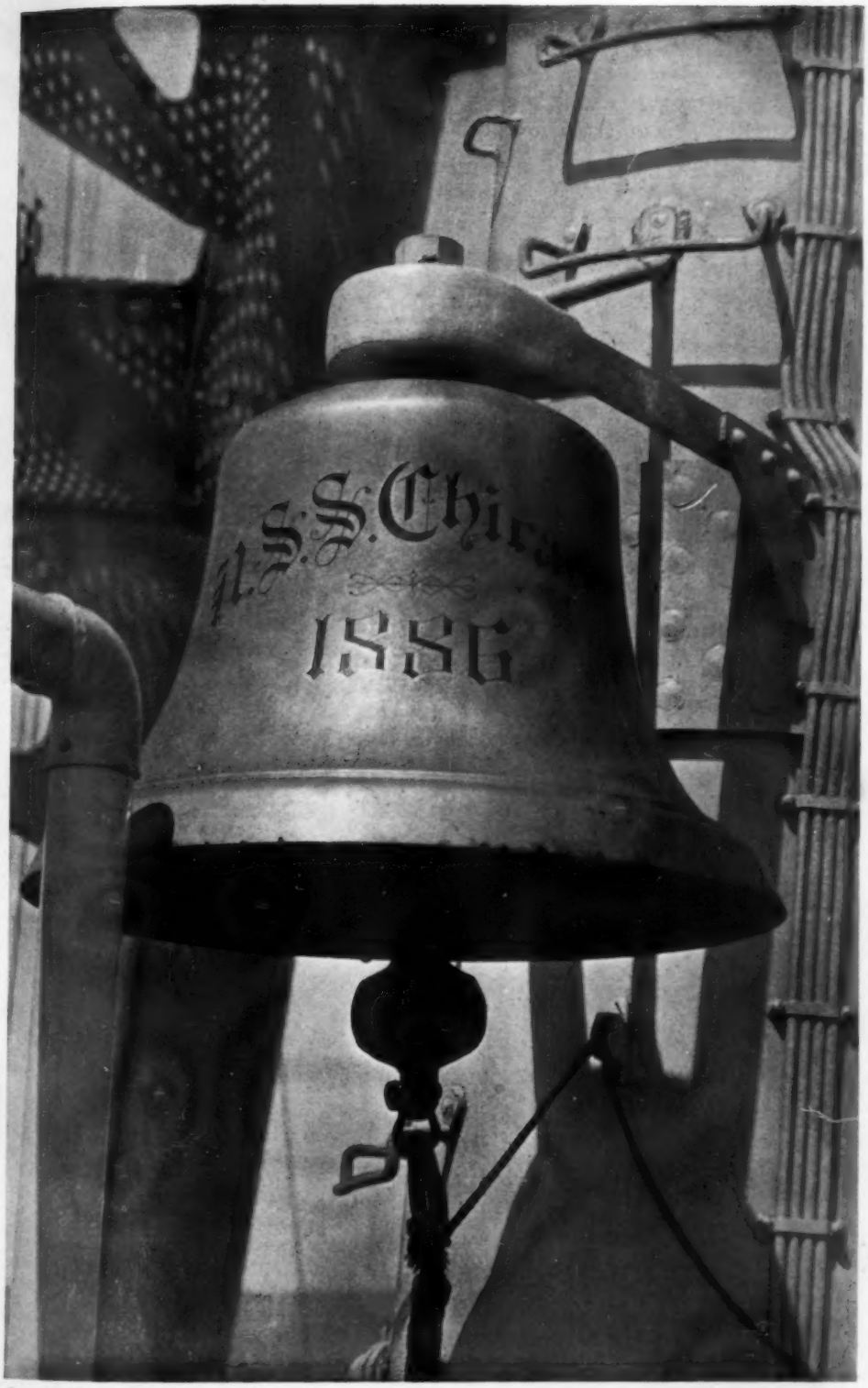
This method has the advantage that the great-circle course can be laid down say at noon each day by the navigator. He is required by the Navy Regulations to report the course and distance to his destination each noon. Therefore if he, from each noon fix, determines the course and distance to his destination on the Weir diagram he has automatically determined the course for the next leg of his great-circle track.

The steps for laying down radio bearings on a Mercator chart by means of the Weir diagram are discussed in *Dutton's Navigation*, and will not be taken up in detail here.

The foregoing explanations may seem long and involved but the actual work when done on the chart is remarkably simple and rapid, and anyone detailed to navigation duty will be well repaid for the hour or two necessary to master these additional uses of the Weir Azimuth Diagram.

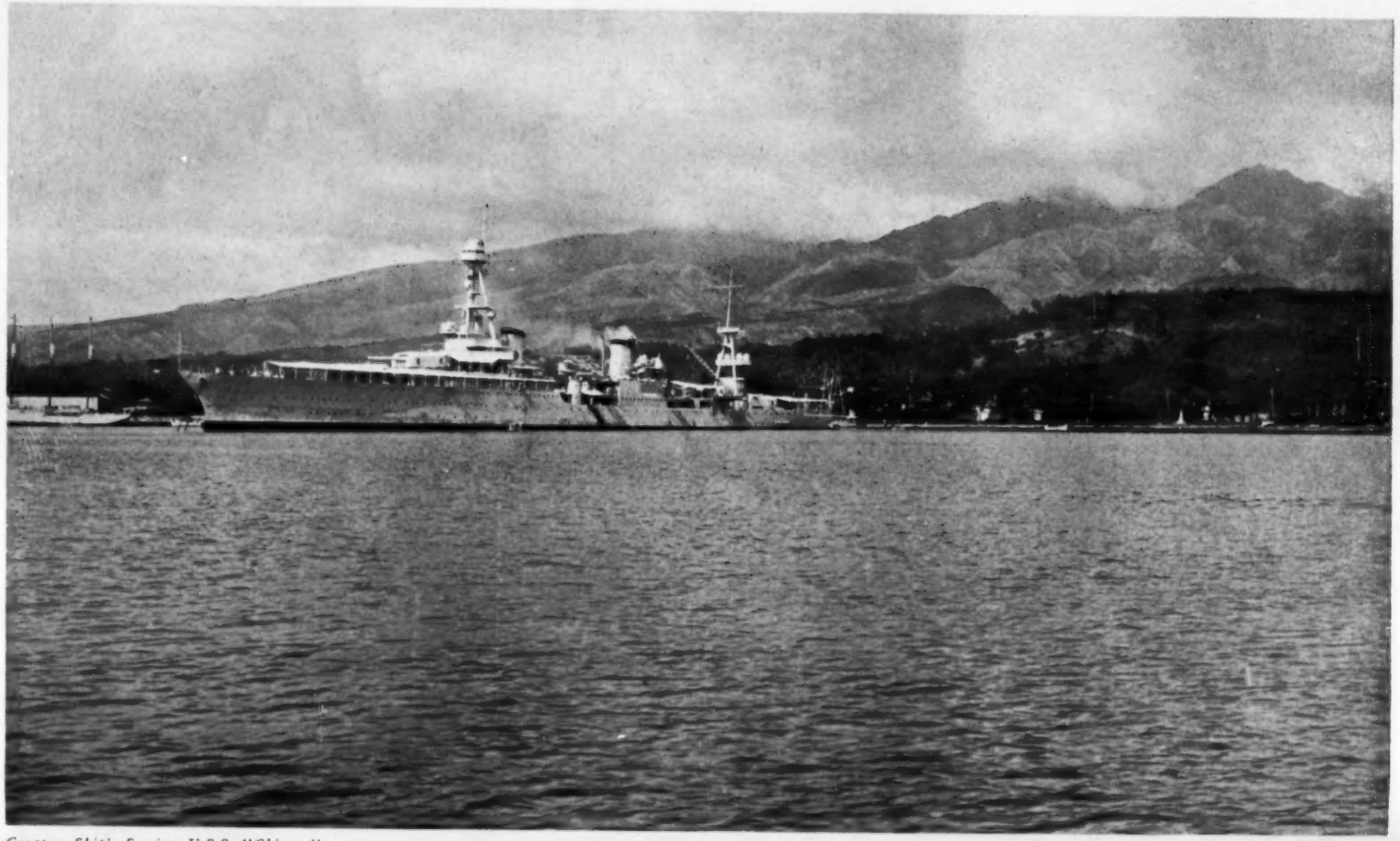
★

THE ADMIRAL *in chief ought as much as possible foresee before the battle the maneuvers to be made; and once fire is opened, the captains ought to be so much under the influence of their admirals' methods of attack and his intentions that signals cease to be necessary for their guidance.*—ADMIRAL BOUET-VILLAUMEZ.



Courtesy Ship's Service, U.S.S. "Chicago"

THE SHIP'S BELL OF THE ORIGINAL *CHICAGO*, NOW IN USE ON BOARD THE PRESENT CRUISER OF THE SAME NAME

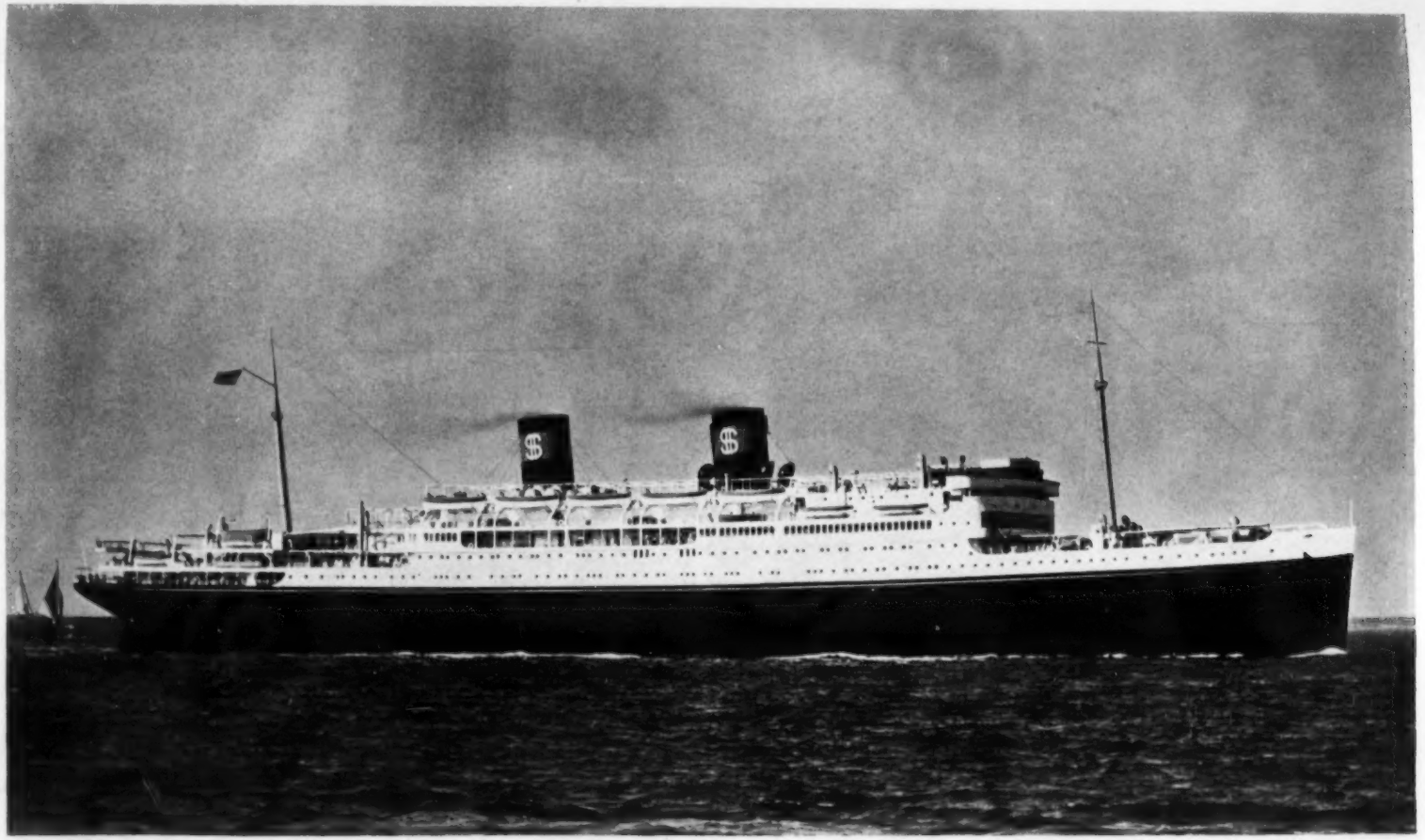


Courtesy Ship's Service, U.S.S. "Chicago"

AT ANCHOR
Tahiti stretches away in the background.

Courtesy Ship's Service, U.S.S. "Chicago"

AT ANCHOR
Tahiti stretches away in the background.



Courtesy Dollar Steamship Lines

SS. *PRESIDENT HOOVER*
Flagship of the Dollar Steamship Lines in New York-California-Orient service.

Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

HULKS OF THE DESTROYERS *DALE* AND *OSBORNE*

The vessels are in the process of conversion into fruit carriers for the Standard Fruit Co. (See Secretary's Notes.)

Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

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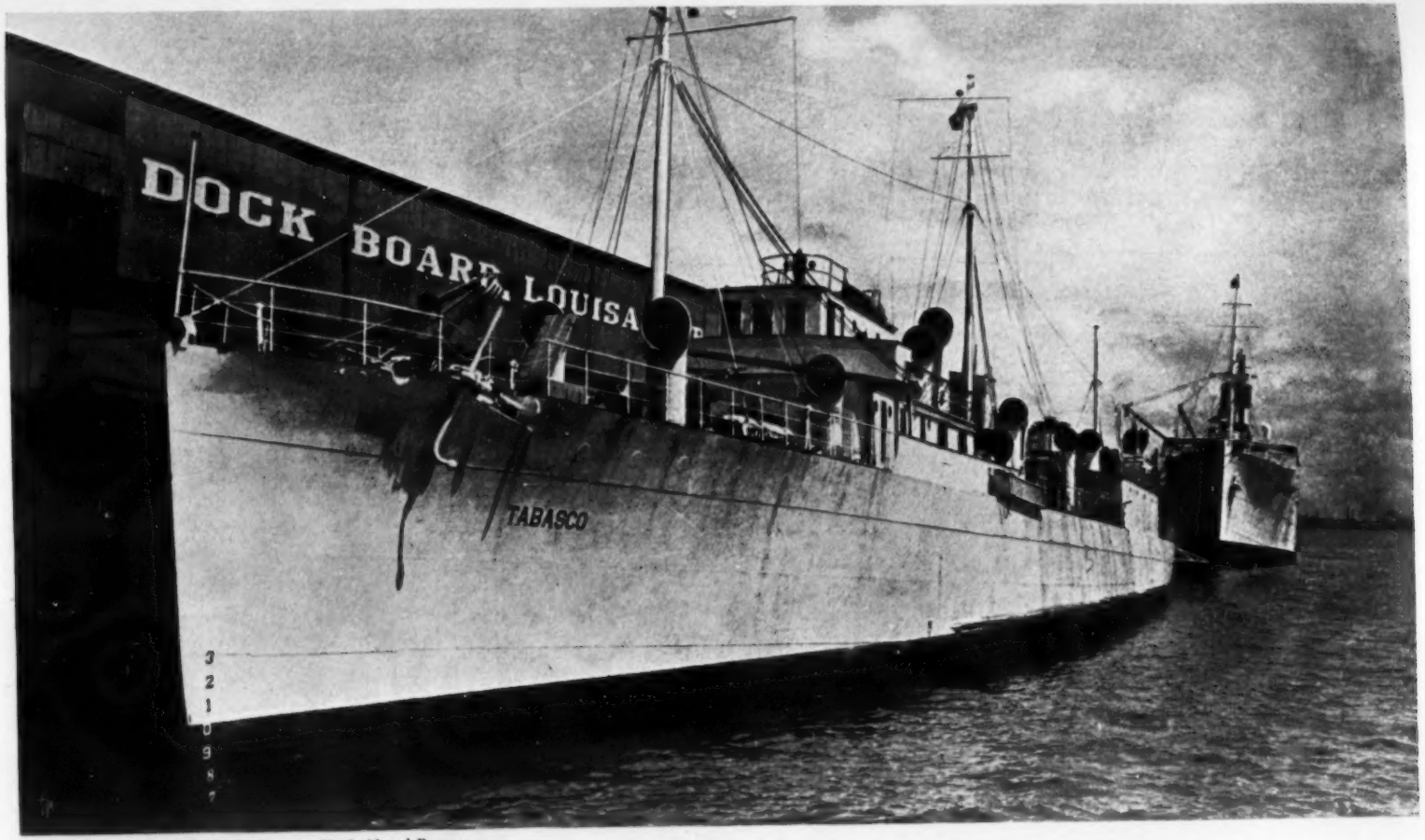


Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

THE FORMER U.S.S. *PUTNAM* AFTER CONVERSION INTO THE SS. *TABASCO* FOR THE STANDARD FRUIT CO.

Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

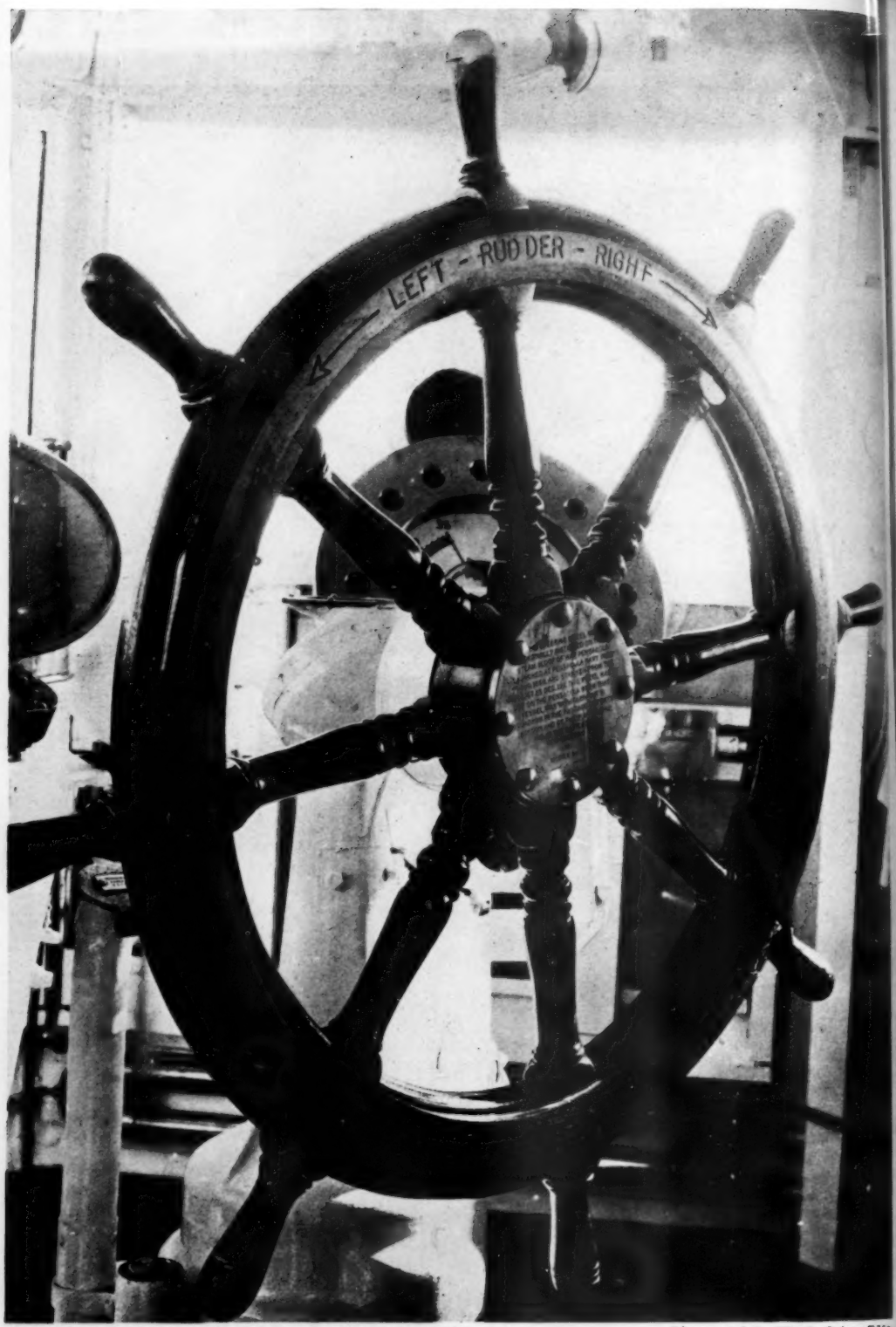
THE BRIDGE OF THE SS. *TABASCO*

Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

THE BRIDGE OF THE SS. *TABASCO*

Courtesy Lieutenant Frederic D. Powers, U. S. Naval Reserve

STERN VIEW OF SS. *TABASCO*, FLYING THE NICARAGUAN FLAG



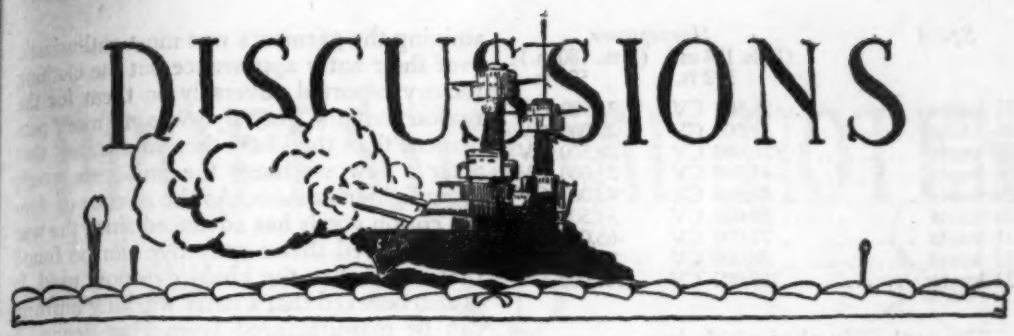
U.S.S. "Pensacola," Captain A. G. Howe, U. S. Navy, Commanding *Photograph by W. E. Price, EM3c*

STEERING WHEEL OF U.S.S. *PENSACOLA*

This steering wheel was recently installed and the ship is now steered by it. It bears the following inscription:

This steering wheel was originally installed on the steam sloop of war *Pensacola* launched at Pensacola Navy Yard 15 Aug. 1859, and stricken from the Navy List 23 Dec. 1911. This wheel was in use on the *Pensacola* when that vessel was with Farragut's Squadron in the passage of Forts Jackson and St. Philip 24 Apr. 1862, and in the battles of New Orleans and Mobile Bay.

DISCUSSIONS



The London Treaty and American Naval Policy

(See page 1097, August, 1931, PROCEEDINGS)

REAR ADMIRAL W. T. CLUVERIUS, U. S. NAVY.—The force of Captain Knox's statement that "there is nothing new in government by public opinion created through the press" was impressed upon me as I was reading his interesting paper in the August PROCEEDINGS on "The London Treaty and American Naval Policy."

I was just reading his conclusion in which he said: "We have for example at the present time foreign opinion constantly appearing in our press that the 8-inch-gun type of 'treaty cruiser' is now 'useless,' with the implication that the United States would make a serious mistake to build up to her treaty quota in this type," when there came to my desk an American metropolitan daily with the caption "Indications Point to Abandonment of 10,000-Ton Ships." This proved to be the headline of a wireless dispatch of two columns from a foreign correspondent directed against five ships of that displacement belonging to an over-seas power and, in reality, an indictment against the design rather than the deficiencies in inherent military qualities. Lack of protection and restricted steaming radius are particularly criticized. As a matter of fact, it is known by all of us who have units of this type and size that they could carry more armor and can steam at higher sustained speed than the smaller cruisers which are referred to as having such a great steaming radius. And speed is no mean necessity in cruiser doctrine.

Incidentally, high praise is given in this dispatch to the *Deutschland*. Well, she is nothing but a 10,000-ton cruiser with larger caliber guns. Here is a glaring inconsistency. This correspondent believes the German ship has "hopelessly outclassed" the treaty cruiser and he states that he believes "that the 10,000-ton ships will soon be recognized for what they are—white elephants—and their construction cease."

They may be "white elephants" for his country and he wants them to be "white elephants" for ours. Here is an excellent example of the purest propaganda and prepared so attractively that hook, line, and sinker may be swallowed without physical distress and, in fact, with much mental relish.

The Speed of Cruisers

(See page 1331, October, 1931, PROCEEDINGS)

Extract from an article by Monsieur C. Rougeron entitled "The *Deutschland* and the Evolution of the 10,000-ton Cruiser," published in the *Journal de la Marine Marchande*, Paris, June 11, 1931.

The author makes an interesting comparison of speed and corresponding horsepower obtained from trial data of the last three 10,000-ton cruisers of the *Salt Lake City* type, as published in the *Journal of the American Society of Naval Engineers* for November, 1930; and the corresponding horsepowers for a theoretical hull of the same form and propulsive characteristics whose length has been increased to 591 feet (180 meters), the length of the *Deutschland*. Such a comparison is considered warranted and informing, owing to the fact that the *Deutschland* and the United States cruisers are not greatly different in length—174 meters as compared with 180 meters on water line (572 feet as compared with 591 feet). (It will be noted that *Jane's Fighting Ships 1930* gives a length of 593 feet on water line for the *Deutschland*). The comparative figures are quoted in the following table, from which it is concluded that the *Deutschland* with a designed horsepower of 50,000 may be expected to approximate 30-knots speed.

Speed	*Horsepower* (lgth. 174 m.) 572 ft.	(lgth. 180 m.) 591 ft.
25 knots	28,500 CV	23,500 CV
26 knots	32,000 CV	27,000 CV
27 knots	36,000 CV	29,500 CV
28 knots	41,500 CV	35,000 CV
29 knots	48,500 CV	42,000 CV
30 knots	59,000 CV	51,500 CV
31 knots	72,000 CV	65,000 CV
32 knots	88,000 CV	82,000 CV
33 knots	107,000 CV	101,000 CV

The author further concludes:

Moreover, the propulsive efficiency of a ship is easier to improve, the lower the designed horsepower, owing to the smaller effect of appendages which tend to increase the resistance. In the region of 30-knots speed, the *Deutschland* with its 50,000 designed horsepower has the advantage, therefore, over a hull such as that of the *Salt Lake City* which at the same speed must nevertheless overcome the resistance of appendages of a design suitable for a speed of 33 knots.

Following a tradition common to all navies and observed with special respect in the German Navy, the latter will surely not have failed to allow a respectable margin between the maximum horsepower in normal service and the maximum horsepower on trials.

From these circumstances it appears certain that the speed of the *Deutschland* in service will be close to 30 knots, and that this figure will be exceeded at reduced displacement and by forcing the boilers (?).

Working Uniforms for Summer

(See page 1404, October, 1931, PROCEEDINGS)

CAPTAIN GEORGE BROWN, JR,. (S.C.), U. S. NAVY.—The suggestion of a khaki-colored working uniform is of more than passing interest to me, for I have studied textiles and the manufacture of clothing. Khaki is not a naval color and does not blend with the Navy's general color scheme. It shows grease spots plainly and it is grease that most often gets on naval officers' uniforms. Shortly after the World War, Admiral Hugh Rodman suggested navy gray war color for cotton uniforms for both officers and men and several suits were manufactured. These were of the cut of present whites. Officers' blouses had brass buttons and loops for shoulder marks. Everyone examining the garments was most enthusi over their natty appearance but the clot factory reported adversely on them for reason that the gray dye was no more p manent than the khaki then in use, and after a few washings the uniforms wo grow lighter in color. As the science of d ing cotton goods has advanced since the w it is believed that a gray dye can be fou that is equal to the khaki dye now used. is also believed that a natty working unifor can be manufactured from blue denim. fast blue dye is on the market but is not ge erally used for dungarees as dungarees a cheap garments and their cost must be he down to the minimum.

Some thirty-five years ago the Navy g helmets a long and thorough trial and fou them entirely unsatisfactory. They could n be worn with comfort below deck and th were continually being dented which co not be effaced. Also they took up too mu room in trunks and in staterooms. Many o ficers purchased cheap straw helmets inste of the expensive cork ones, as they fou that it cost less to throw the cheap helme away when they changed duty than to tak up so much trunk room.

If a summer working uniform is contem plated great care must be exercised in de termining its cut. A roll collar coat cannot b made to look natty after it has been sen to a laundry. The collar is always stretche out of shape and after one or two washing becomes a perfect misfit. There should b no stripes on the sleeves for it is next t impossible to get braid that will shrink o stretch evenly with the goods from which the garments are manufactured.

To date no cotton coat or blouse has bee designed that will hold its shape as well a the present white coat. A colored cotto blouse of the present white coat design wil not require the purchase of colored shirts that cannot be used with other uniforms and civilian clothes. Cotton uniforms wrinkle easily and must be laundered frequently in order to appear natty and the cost of laundering a colored cotton uniform is the same as for a white.

PROFESSIONAL NOTES

SEPTEMBER 1 TO SEPTEMBER 30

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Naval Treaty Figures—Figures Don't Lie, But . . .—Figures of Recent Years—The Vital Difference—Federal Retrenchment—Philippine Independence—Need of Cruisers—Tradition—Coast Defense—Air Strengths

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The Siege of Germany—Equality for the Reich—French Figures—Armament Report to the League of Nations

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French View of Italian Building

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CHILE 1572
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THE NETHERLANDS 1572
Armament Report to the League of Nations

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The New Cunarder—National Merchant Marine Academy—Various Notes

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Japanese Air Regulations for Foreign Aircraft—Aircraft Carrier and Flight-Deck Cruiser Tonnage—Naval Aviation Developments—Commercial Aviation and the 1932 Disarmament Conference—Italian Air Force Maneuvers—Blind Flying—A New British Fighter—Turkey Buys Italian Planes.

UNITED STATES

Naval Treaty Figures

Navy Department, Washington, September 13.—The following notes on the navies affected by the Washington and London treaties for the limitation of naval armaments have been prepared in the Navy Department, and are made public, following many requests for information from the press and other organizations.

The Washington treaty of 1922 limited capital ships and aircraft carriers as follows:

	United States	*Great Britain*	*Japan*	*France*	*Italy*
	Tons	*Tons*	*Tons*	*Tons*	*Tons*
Capital ships	525,000	525,000	315,000	175,000	175,000
Aircraft carriers	135,000	135,000	81,000	60,000	60,000

The treaty signed at London April 22, 1930, by the United States, Great Britain, and Japan limits other types of ships as follows:

	United States *Tons*	*Great Britain* *Tons*	*Japan* *Tons*
Cruisers, 8-in.-gun type	180,000	146,800	108,400
Cruisers, 6-in.-gun type	143,500	192,200	100,450
Destroyers	150,000	150,000	105,500
Submarines	52,700	52,700	52,700

The London treaty further stipulates that no capital ships are to be laid down during the years 1931-36, except that France and Italy may build the replacement tonnage which they are entitled by the Washington treaty to lay down in 1927 and 1929.

The following tables, completed as of the date of signing the London treaty, April 22, 1930, show: (1) The tonnage which each of the countries concerned may lay down and complete in each category by December 31, 1936. (2) The additional tonnage which may be building at that time. (3) The average which must be laid down in each of the intervening years in order to have a treaty navy composed of vessels within the age limit by December 31, 1936. This table takes into consideration the recognized length of time required to build each type of vessel. (4) The steps (building programs) which the countries have taken since the treaty was signed to arrive at a treaty navy by December 31, 1936.

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(1) Table showing tonnage as of April 22, 1930, which each of the countries concerned may lay down and complete (in addition to that already appropriated for, or building) in each category by December 31, 1936.

	United States	*Great Britain*	*Japan*	*France*	*Italy*
Capital ships	.....	.....	.....	70,000	70,000
Aircraft carriers	55,200	90,000	19,600	60,000	60,000
Cruisers A (8-inch type)	20,000	.....	.....	(*)	(*)
Cruisers B (6-inch type)	73,000	91,000	35,755	(*)	(*)
Destroyers	150,000	110,839	25,745	(*)	(*)
Submarines	25,100	17,651	12,000	(*)	(*)

* Not limited by treaty.

Note.—The comparatively large tonnage available to Great Britain for new aircraft carriers is due to the fact that 3 of her carriers, aggregating 55,900 tons, which were completed in 1924 and 1925, are considered as experimental, in addition to the *Argus*, which was completed in 1918.

(2) Table showing additional tonnage which may be building December 31, 1936, assuming that the tonnage listed in the above table has been completed.

	United States	*Great Britain*	*Japan*	*France*	*Italy*
Cruisers A (8-inch type)	10,000	.....	.....	*	*
Cruisers B (6-inch type)	14,100	86,070	16,165	*	*
Destroyers	.....	2,960	8,095	*	*
Submarines	14,830	6,395	7,200	*	*

* Not limited by treaty.

(3) Table showing the average tonnage which must be laid down in each of the intervening years in order to have a treaty navy composed of vessels within the age limit by December, 1936, taking into consideration the recognized length of time required to build each type of vessel—tonnage already provided for when the treaty was signed is not included in the year 1930.

	United States	*Great Britain*	*Japan*	*France*	*Italy*
Aircraft carriers:					
1930	13,750	22,500	4,900	15,000	15,000
1931	13,750	22,500	4,900	15,000	15,000
1932	13,750	22,500	4,900	15,000	15,000
1933	13,750	22,500	4,900	15,000	15,000
*Cruisers B (6-inch type):					
1930	14,600	18,200	7,151	.....	.....
1931	14,600	18,200	7,151	.....	.....
1932	14,600	18,200	7,151	.....	.....
1933	14,600	18,200	7,151	.....	.....
1934	14,600	18,200	7,151	.....	.....
*Destroyers:					
1930	25,000	18,473	4,291	.....	.....
1931	25,000	18,473	4,291	.....	.....
1932	25,000	18,473	4,291	.....	.....
1933	25,000	18,473	4,291	.....	.....
1934	25,000	18,473	4,291	.....	.....
1935	25,000	18,473	4,291	.....	.....
*Submarines:					
1930	5,020	3,530	2,400	.....	.....
1931	5,020	3,530	2,400	.....	.....
1932	5,020	3,530	2,400	.....	.....
1933	5,020	3,530	2,400	.....	.....
1934	5,020	3,530	2,400	.....	.....

*France and Italy not parties to this part of the treaty.

Note.—The Japanese have their allowance of submarines built and building which will still be within the age limit December 31, 1936, but a special provision of the London treaty permits them to replace 12,000 tons before that date.

(4) The following have been provided for since the treaty was signed in April, 1930: 1930-31 program (French program for 1930 was approved in March before treaty was signed in April):

	United States		*Great Britain*		*France*		*Italy*	
	No.	*Tons*	*No.*	*Tons*	*No.*	*Tons*	*No.*	*Tons*
Cruisers (8-inch type)	..	.....	..	.....	1	10,000	1	10,000
Cruisers (6-inch type)	..	.....	3	19,500	*1	.....	2	10,500
Destroyers	..	.....	9	12,375	6	15,000	4	4,960
Submarines	..	.....	3	†3,000	11	11,226	22	17,740
					‡2			
					§1			
1931-32 PROGRAM								
Battleships	..	.....	..	.....	1	‖23,000	(¶)	.....
Cruisers (6-inch type)	..	.....	3	18,000	2	‖13,600	(¶)	.....
Destroyers	**11	16,500	9	†12,375	..	(‖)	(¶)	.....
Submarines	..	.....	3	†3,000	2	(‖)	(¶)	.....
			††1		††1			
			‡4		‡‡1			
			*1					
			§1		§§4			

*Mine laying. †Estimates. ‡Sloops. §Net layer. ‖Net yet voted. ¶Program for 1931-32 not yet published. **The Navy Department asked for 1 carrier of 13,800; 1 flying deck cruiser (9,000 tons); 1 cruiser (7,000 tons); 4 submarines (4,000 tons); 12 destroyers (already authorized in 1916). The House Committee eliminated the cruiser. Congress provided for 11 destroyers. ††Gunboat ‡‡Transport. §§Escort ships.

Note.—Japanese press, about December, 1930, reported the following 1931-36 program: 4, 8,500-ton cruisers, first line; 12, 1,400-ton destroyers, first line; 9 submarines; 1 mine layer; 3 small mine layers; 4 torpedo (?) boats; 5 mine sweepers. Also 12 new air squadrons to be added.

The Japanese press has stated that Japan does not propose to complete this entire program by December 31, 1936, but intends to have certain units in stages of construction. The purpose of this, according to an interpretation of the Japanese press, is that Japan, in 1936, won't be "frozen" in types of ships, and also that she will have with her new and present ships, complete treaty tonnage plus new ships building, the latter to be used as a bargaining power at the next disarmament conference.

Figures Don't Lie, But ...

Sun, Baltimore, September 15.—For the first time in years the Navy Department has issued a statement tending to minimize the need for new naval construction on the part of the United States. The tables made public by the department yesterday, while nominally purporting to indicate that the United States has lagged in new naval construction since the London naval conference, actually reveal that this country is so well abreast of England in treaty tonnages as to make the question of further building at this time a matter of no urgent concern.

Thus the department's statement showed that when the treaty was signed at London the United States was well ahead of England in cruisers built, building, and appropriated for within the treaty limitations. The same is true as to aircraft carriers. To be sure England has appropriated for 37,500 tons of new cruisers since the London conference, but even when they are completed the British Navy will have a superiority of only 19,500 tons in vessels of this category. Such a margin in a total tonnage of more than 320,000 is hardly a matter to get excited about. In aircraft carriers we shall still be ahead.

In destroyers and submarines the British were ahead of us, but both nations were well under the treaty limits and neither, according to the Navy Department's own figures, has set out to build up to the full tonnages the treaty allows. The showing is encouraging, for it permits the nation to infer from the Navy's own compilations that there is no longer any reason for us to work ourselves into a lather over the deficiencies of our naval strength. The same inference may be drawn from the Navy's revelation that Japan, the third naval power in the world, has not authorized or appropriated a dollar for new construction since the London conference. Japan has done a good deal of naval building in recent years, and is closer to the tonnages allowed by the London and Washington treaties than any other nation. But it would seem to be willing to let its shipyards lie idle for a while rather than burden itself with new construction costs at this time when national finances are on none too prosperous a basis.

Figures of Recent Years

According to Captain Knox in the *Herald Tribune,* New York, September 27, the following table shows the number of ships and corresponding tonnage undertaken by the several powers since 1922:

	Ships	*Tonnage*
United States	33	186,000
United Kingdom	96	350,000
Japan	114	320,000
France	149	300,000
Italy	110	200,000

The Vital Difference

Army and Navy Journal, Washington, September 19.—As the construction under the London treaty is mainly replacements of over-age vessels for Great Britain and Japan, while for us it is new construction allowed so that we may catch up to the ratios established by treaty for the powers, it may be seen what a building holiday would do. It should be obvious that over-age vessels can lick paper vessels, but some people, it seems, cannot understand it.

Federal Retrenchment

Times, New York, September 26.—Appropriations are distributed under seven main heads in the following proportions: Interest and principal on the national debt, 26 per cent; pensions and care of disabled veterans, 18 per cent; Federal building program, 11 per cent; trust funds and tax refunds, 5 per cent; support of the Army and Navy, 18 per cent; special aids to agriculture, industry, merchant marine, etc., 12 per cent; law enforcement and ordinary expenditures of the civil departments, 10 per cent.

Of these seven main groups the first four lie beyond the reach of any present endeavor to economize. Now these four groups of expenditures account for 60 per cent of the budget. Any economies which the President is able to propose must therefore come from the remaining 40 per cent devoted (1) to special funds, (2) to support of the Army and Navy, and (3) to the ordinary expenditures of the departments.

In these circumstances the opportunities for Federal retrenchment are strictly limited. *It would be possible, in fact, to abolish the entire Army and Navy, as well as the departments of State, Commerce, Labor and Justice, and still fall short of effecting a saving sufficient to offset the loss of $995,000,000 now indicated in revenues.*

United States Daily, Washington, September 16.—Economy in Federal expenses to prevent tax increase legislation at the

next session of Congress was advocated orally September 15 by Senator Glass (Dem.) of Virginia.

Senator Glass asserted that Federal military expenses easily could be cut in half in conjunction with other economical measures. Government expenditures are beyond reason and could be cut from the present $5,000,000,000 annually to $3,000,000,000, Senator Glass said.

Times, New York, September 29.—The administration's heaviest blow in its efforts to cut governmental expenditures to the bone will be directed against the Navy and may result in decreasing the Federal budget for the fiscal year 1933 by more than $150,000,000.

This will be accomplished by the elimination of the naval building program for the fiscal year 1932-33 and halving the destroyer program appropriated for in the final session of the seventy-first, or last, Congress.

The scrapping of the 1932-33 program, if approved by Congress, where it will command strong support, will mean the relegation of the United States to third place among the sea powers, according to naval statisticians. Great Britain would be in first and Japan in second place when the tonnages are measured by terms of the London treaty.

The decision to eliminate the 1932-33 construction program was made two weeks ago, according to the information obtained by The New York *Times.* In the matter of halving the authorized destroyer program, the first decision was to include all eleven of the destroyers in the "slash," despite the fact that the construction of one of the ships already has been allotted to the New York Navy Yard and bids for the building of the other ten have been opened.

It appeared, however, that if the program was completely scrapped, it would result in a serious unemployment situation in several of the yards, including the New York yard. This being so, it was decided to go ahead with building five of the destroyers. The estimated completed cost of the eleven is $56,000,000. Failure to contract for five of them will save about $25,000,000.

The big saving would be in the elimination of the 1932-33 program, which had been approved by Secretary Adams, the General Board, and Admiral Pratt, chief of naval operations, and in the case of the air allotments, also by Rear Admiral Moffett, chief of the Bureau of Naval Aëronautics. More than $80,000,000 of the $130,000,000 was for building up and equipping the air arm of the service.

United States Daily, Washington, September 30.—It is not possible to place orders at this time for the construction of the six remaining destroyers for which bids and estimates were received on account of the necessity for limiting budget expenditures during the current fiscal year, but plans for building them have not been abandoned, of course.

It is not understood that the department has been cut off ultimately from building all the destroyers either by budgetary considerations or proposals for a naval holiday which have been made in Geneva. Under the present plans emanating from the League of Nations disarmament conference there, it appears the department could proceed when it pleased with the destroyers, although it should be remembered that the final wording of an agreement, if such were worked out, might make it impossible to build the vessels.

Philippine Independence

Times, London, September 5.—All things considered, it would be well if those who are forced to consider the large field of Far Eastern policy should assume as an early possibility the grant by the United States of independence to the Philippines. The temper of the next Congress is, of course, unpredictable with complete certainty, but the chances of such action cannot wisely be minimized.

Need of Cruisers

Naval and Military Record, Plymouth, September 2.—In the current number of that always interesting publication, the United States Naval Institute PROCEEDINGS, there appears an article by Captain Dudley W. Knox, U.S.N. (retired), entitled "The London Treaty and American Naval Policy." Captain Knox appears to have come to the conclusion that the United States has need for many more cruisers than her parity proposals will give her.

Tradition

Captain Felix Riesenberg in the *Nautical Gazette,* New York, September 5.—I am naming the new fleet. Perhaps, before these ships are scrapped the economizers and pro-

hibitionists will be glad we have them. So here they are.

Ships of the line: U.S.S. *John Paul Jones; Commodore Hopkins* (I like the idea of swinging in a naval title, after the romantic fashion of our South American friends); *Barry; Dale* (after the lion-hearted first lieutenant of the *Richard*); *Hull; Bainbridge; Decatur; Preble; Stewart; Rodgers; Porter; Truxton; Perry; Farragut;* and, for a change, *Wilkes* (all he did was to discover an anarctic continent).

Now the names of fine ships means practically nothing to me, or to anyone else, so far as I can discover. The Navy seems to be at low tide. I have a son who wants to go in the Navy—he is now serving as an oiler (by permission of the chief) on a collier, and hankers after machinery at sea, with a yen for flying. People tell me, after hearing him, that the Navy is no place for a bright boy.

"Of course, if he goes to Annapolis he will get a good education, but he can always quit and go into business on the strength of it." This is the general idea, so far as I have been able to gather. Use the Navy, up to a certain point, then quit.

If the satisfactions of life are in the job, then give the job every bit of glamour it possesses. The average citizen, if put upon oath, would declare the five and ten cent stores a greater institution than our Navy, and of course, Standard Oil is much more important still, and Ford is greatest of all, but these people neglect no chance to build up their own small world, while the Navy passes by its great imaginative appeal by deliberately forgetting its tradition in the naming of its ships.

Coast Defense

The following are extracts from a splendid article entitled "Some Lessons from Lissa" by Colonel W. G. Caples, Corps of Engineers, in the *Military Engineer,* Washington, September-October. It will be recalled that the Italian fleet was engaged in reducing the island of Lissa when the Austrian fleet struck.

The first principle to be observed in holding an outlying station is so to fortify that the garrison can hold out until the fleet can arrive. Other considerations than fleet speed enter into the matter. A month may suffice to move a nation's fleet from any base to any other. But the fleet may not be able to move promptly. A very slow mobilization can easily hamper the movements of a fleet for several important months. A longer time than one month must be provided for; how much longer is simply an educated guess; as good a guess as any is about six months. . . .

Eight inch guns, such as the Navy uses, have a range of about twenty miles. . . . If guns of the type noted are placed in pairs, with about twenty miles between pairs, around the perimeter of an island, a defended zone seventeen miles wide is created in which a ship less than capital should last hardly more than a minute or two. If the spacing be only ten miles between pairs, the accidental disabling of any pair by hostile fire will leave the system still intact, while the loss of two consecutive pairs will reduce the width of the defended zone by only four miles. Without other fortification an attack is unlikely, although there may be some harassing. It is well to take no chances and round out the defense by placing anti-aircraft guns about the larger ones to prevent annoyance to the personnel firing on the ships, and by adding submarines and airplanes to make smoke and fog unhealthy for the use of the attacker. . . . the Italians weakened the fighting power of their fleet . . . in demonstrating the truth of the naval axiom, that fools fight forts.

Air Strengths

Herald Tribune, New York. September 21.—In a 47-page pamphlet purporting to show in detail the relative air strength of the principal powers, Carl Byoir and Associates, of 10 East Fortieth Street, New York City, declares that the United States ranks fourth.

Supremacy in military aviation is attributed to France, while the British Empire takes second place and Italy third. Russia and Japan are rated next in order, but the Soviet government is said to be "the most ambitious of all, planning to develop her Red Air Fleet until it matches the combined forces of Europe."

The following table is cited to show national strength in the fighting airplanes of each country, including both active and reserve planes, but excluding experimental and obsolete machines:

Great Britain	1,593
Dominions, etc.	472
British Empire	2,065
France	4,683
Italy	1,834
Japan	1,312
Russia	1,520
United States	1,809

In the number of civil planes the United States is shown to be far in the lead, with twice as many as have the other powers combined. There are 10,235 planes in this country, as against 2,070 in the British Empire and 1,320 in France.

GREAT BRITAIN

The Naval Unrest

Times, London, September 18.—HOUSE OF COMMONS, Thursday, September 17. Mr. W. G. Hall (Portsmouth, Central, Lab.) asked the First Lord of the Admiralty whether he had any further statement to make as to the unrest in the Navy with regard to the reductions in pay.

Sir A. Chamberlain.—In consequence of the decision, which I announced yesterday, the following order was issued to the fleet:

> The Board of Admiralty is fully alive to the fact that among certain classes of ratings special hardship will result from the reduction of pay ordered by his Majesty's government. It is their direction that ships of the Atlantic Fleet are to proceed to their home ports forthwith to enable personal investigation to be made by the commander in chief and representatives of the Admiralty with a view to necessary alleviation being made. Any further refusals of individuals to carry out orders will be dealt with under the Naval Discipline Act. This order is to be promulgated to the fleet forthwith.

In accordance with this order the fleet sailed yesterday. . . .

The debate on the Budget Resolutions was interrupted at half-past seven, when Mr. W. G. Hall moved the adjournment of the House in order to call attention to the unrest in the Atlantic Fleet which had been caused by the reductions of pay proposed by the government. He said he had been warned from all quarters of the House that he was dealing with a very delicate question, and he realized that more than most. They were told that the trouble began on Sunday, so that for some days fifteen ships had been in a state of unrest and naval ratings had carried out what might have been described as passive resistance. From those facts certain definite things emerged. The gesture which had been made was not the work of a few, but was universal throughout the Atlantic Fleet so far as the ratings were concerned, and the commander in chief had acted with promptitude, dispatch, and great common sense. (Cheers.)

Sir A. Chamberlain.—I desire at once to express my appreciation of the way in which the honorable and gallant member treated a very delicate subject. I shall address myself to it in the spirit which he showed. I was particularly glad to hear the honorable and gallant gentleman pay a tribute to the senior officer commanding the Atlantic Fleet during those anxious days in the absence of the commander in chief, who unhappily is in hospital. The Admiralty have already conveyed to the commander in chief their full appreciation of the action which he took and of his service during those times. The compliment which the honorable and gallant gentleman paid to him was one which was well deserved and would, I am sure, be most warmly appreciated by the men of the fleet which he commands. The honorable and gallant member said, I think with perfect truth, that there had been no disrespect shown to officers, no violence of any kind, though there was an incident, there was action, which cannot be excused. At least I might almost say that if such action were taken at all, it speaks well for the general discipline of the fleet that it should have passed so quietly and without any disturbance except to the actual routine of duty.

There is one further observation I want to make. I think the statement that has appeared in the press that the fleet was recalled appears to have conveyed to the lay mind an inaccurate impression of what took place. When the unrest showed in the ships in harbor, certain of the ships had already proceeded to sea in pursuance of the routine work, and the admiral thought it desirable in the circumstances to recall those ships and concentrate the fleet. That is the whole of what is described as the recall of the Atlantic Fleet in various statements that I have seen. So much I wish to say on the facts that took place. I turn to the particular case which the honorable and gallant gentleman made, not in justification but in palliation of what a portion of the fleet did. It was, of course, profoundly distasteful to my colleagues and myself, whether I speak of my political colleagues in the government or of my colleagues on the Board of Admiralty, to have to ask for these sacrifices from men of the naval service, just as it was to have to impose other sacrifices which the financial situation rendered necessary.

The whole country is paying now for a course of policy to which each party, I am afraid, has contributed. It can be summed up in these words, that we have been living beyond our means at times when our means are decreasing.

I have mentioned the officers. Let me say that, as far as I know, there has not been one word of complaint by the men of differential treatment of their officers, and the spirit between officers and men has been the spirit of comradeship and sympathy which has always characterized the Navy. (Cheers.) It is not fair to make that comparison without, at any rate, recalling the fact that, while the men's rates of pay have remained unaltered, the officers' pay has been cut again and again; this is a cut on a cut, unlike the case of the other ranks to whom a cut is applied. What is the cut? It is not the establishment of a new rate of pay unknown to the Navy hitherto. What the government asked was that the men who had enlisted previous to 1925 and enjoyed the rates which followed the Jerram Committee should now accept the rate which men in similar positions and doing the same duty receive if they entered at any time after 1925. It is not a general reduction in the scales of pay in the Navy, it is the assimilation of the pay of men who entered before 1925 to that of the men who entered after 1925. That is the whole of the change which is made in the pay.

That does not quite close the question, I admit. The men may have been reasonably assured of the

stability of their conditions, because in some cases they have undertaken liabilities, and these cuts place them exactly on a level with men who never had these higher resources, and therefore renders their position one of exceptional hardship and unfairness. That is just the kind of case which has been represented and into which we are going to inquire, and I hope we shall find a method of alleviating the hardship. It is clear that the limits within which we can do that are fairly clearly marked out.

When the new scale was introduced in 1925 for all new entrants it was thought very undesirable to disturb the men who had already entered under the expectation of a higher scale of pay. When the Prime Minister read the letter which the honorable and gallant member quoted both parties in this House, without exception, felt equally the inexpediency of disturbing the arrangement made with these men. I felt its inexpediency then, and I felt it even while I accepted the recommendation. Nothing justified the action we have taken but the national crisis and national necessity. Sacrifices are called for from every one, from every class. The man in the Navy does not stand alone.

I believe that when the men of the fleet realize what the national position is, how universal is the sacrifice required, and when particular cases of unequal hardship on particular classes have been dealt with, they, like other citizens, and they before all other citizens in consequence of their great tradition, will loyally and cheerfully make their contribution to the nation's need. (Cheers.) The honorable and gallant member made an appeal that for what was passed there should be no penalization. The past is past. It is in the interest of every one in the Navy or out of it to forget it. (Cheers.) I am not going to look back. I am going to look forward, and I count confidently on the traditions of the service and of the men of today loyally to uphold me. (Cheers.) In that case there will be no looking back to what has happened on this occasion, but we shall go forward together in the service of the country. (Cheers.)

Mr. Alexander . . . had only two other things to say in view of the course that the debate had taken. The first was that if they were in a position to look back that night without very serious regret at the events of this week, it was due first to the great stability and loyalty to service of the men themselves, and secondly—it had been referred to in two quarters—to the very great service rendered in this crisis by Admiral Tomkinson. The sympathetic and tactful action which the acting commander in chief of the Atlantic Fleet had taken was only what he would have expected from his knowledge of him. (Cheers.)

Mr. Lambert (South Molton, L.) said that, speaking as an old member of Parliament and one who had been connected with the Navy, he thought the House had done itself credit in its treatment of the debate. He desired to pay a great tribute to the honorable member who moved the motion and also to express his gratitude to the First Lord and the late First Lord of the Admiralty. (Cheers.) He suggested that it would be to the advantage of the House and of the Navy if the motion could now be withdrawn. (Cheers.)

Mr. Hall asked leave to withdraw the motion, and this course was agreed to.

Naval Promotion

Naval and Military Record, Plymouth, September 9.—The Admiralty have "started at the beginning" by cutting down the Dartmouth entries to about 90 a year. This retrenchment can have no effect upon the position of lieutenants and lieutenant commanders for a good many years to come. The outlook for the last-mentioned rank is particularly depressing. There are, roughly, about 950 lieutenant commanders on the active list; the actual figures at the moment are a little difficult to give accurately, because of the effects of the scheme of induced retirement. Of these about 500 are a sort of "floating population" in the promotion zone. From this "floating population" 50 selections are made every year. An officer has several chances before he is passed over for the last time, but, allowing for this, it is calculated that of every 8 who reach the rank of lieutenant-commander, only 1 gets beyond it.

Destroyer Strength

Naval and Military Record, Plymouth, September 9.—Within the next few weeks 9 destroyers of the T class are being added to the disposal list. . . . No ship, whatever her type, has passed the span of her effective life so long as her hull remains seaworthy and her motive power functions efficiently. It may be no longer economical to use her: that is quite another matter. It may be no longer necessary to use her, but this scarcely justifies her destruction. . . . Our good friend and neighbor, France, is supreme in submarine strength. We do not believe that she has the remotest idea of employing that submarine strength against ourselves. But she has the means: that is the simple fact which no amount of amicable discussion can get away from. . . . Why, then, scrap any of our existing destroyers so long as they are still capable of doing their work? Maintenance reserve is the most unaggressive form which sea power can take, but a destroyer at

Rosyth or the Nore, tied-up and shut-down save for the occasional visits of her caretakers, represents an insurance which might prove of great service at a critical juncture and of inestimable value should we unhappily find ourselves ultimately on the wrong side of a state of tension.

Smaller Ships

Naval and Military Record, Plymouth, August 26.—In the United States Naval Institute PROCEEDINGS, Commander T. C. Kinkaid, U. S. Navy, returns to the vexed problem of the very big ship. . . .

Commander Kinkaid is a gunnery specialist. In the British Navy we assume—possibly not always quite fairly—this to be synonymous with advocacy of the biggest gun. Naturally, from the premise of the biggest gun the case for the biggest ship follows automatically.

. . . Probably it is inevitable that the specialist always visualizes being able to dictate naval tactics in his own terms. But the whole tendency is for sea warfare to become less and less an affair to be decided by the biggest possible ship and the most monstrously monstrous gun. Unleash the *Deutschland* with general instructions to inflict all the damage she can upon enemy communications, and unleash the *Nelson* to track her down, and what are the odds against the three-times-bigger ship?

Another Argument For Smaller Ships

Fighting Forces, London, July.—The immense battleships of the present day have far more lieutenants (and lieutenant commanders) than was the case in the predreadnought area. *But these huge ships still have only one captain.* It of course follows that the captain's list is far too small nowadays to allow of a fair proportion of junior officers being promoted in due course.

Control of Suez Canal

Tribune, Chicago, September 17.—Great Britain today served notice that it will not permit the council of the League of Nations to interfere with the free passage through the Suez Canal of English warships, troop transports, and munition carriers in event of a threat of war.

Viscount Cecil introduced an amendment to the convention to improve the means of preventing war, which is now being discussed, demanding that the Suez Canal be exempted from Geneva's control.

FRANCE

What France Fears

Living Age, New York, September—In an article appearing in *Les Annales* of Paris but written chiefly for American consumption, Mussolini makes the point that the disarmament conference must succeed or else Bolshevism will spread throughout Europe. This thesis does not win the sympathy of the French, who know that Italy's zeal for peace is partly due to the fact that the country cannot afford to support a large army and navy much longer. Also, the more reactionary Paris newspapers speak of the possibility of a war against Russia almost as openly as the Communists do themselves. Though Germany at the moment is the chief immediate object of concern to France, the most terrifying prospect of all is that of a Bolshevized Germany uniting with Russia. Pierre Bernus, writing in the *Journal des Débats,* says:

> Armament reduction as it is conceived in Berlin, Rome, Washington, and London would reduce the power of resistance of those countries that are now proving obstacles to the projected upheavals from which those who want to create a veritable state of chaos in Europe would profit. The forces of destruction would soon be in the ascendency and an era of violence would begin. It is then that the Bolshevist peril would reveal itself in a menacing fashion.

It should be added that the fear of Bolshevism is a very real thing in Italy, too. The Rome correspondent of the *Journal de Genève* asserts that many Roman Catholics resent the Pope's hostility to Mussolini because they see in Fascism the only safeguard against Communism.

Cruiser Actions

Naval and Military Record, Plymouth, September 2.—(By J. B. Gautreau). Cruiser actions of tomorrow are expected to be sharp and short. The smashing and exploding power of the new 8-inch shells is so great that the 10,000-ton tinclads, or *cuirasses en fer blanc,* of the Washington treaty class are not likely to survive the first well-aimed salvo. The former idea of gunners, inspired from the practices in honor of the times of Nelson and Suffren, was to avoid wasting ammunition, to wait for the enemy to come within easy range, now and then firing a few shells just to play on the nerves of the other side, and keep in touch with the ever-changing range. It was ap-

parently the tactics of the gallant but unlucky Admiral Cradock at Coronel. That sort of game is up. Next time succeeding volleys will be hurled at the enemy, emptying bunkers; and then will be the chance, if the target happens to keep on floating, for "full speed ahead" (as von Spee ought to have done at the Falklands instead of keeping on the defensive) and for torpedo work, and, maybe, for ramming. The issue will be wholly, or very nearly, in the hands of gunners. It will be gambler's throw. The Washington cruisers, even of the semi-armored type, are in a worse shape, repeating the pre-war blunders with the early *croiseurs-cuirassés* and battle cruisers. They are overgrown destroyers, only fit for guerilla warfare and *guerre de commerce.*

Submarines

Naval and Military Record, Plymouth, September 9.—(By J. B. Gautreau).

The belated 1,560-2,080-ton *sousmarins de première classe Poncelet* and *Henri-Poincaré* are due next week to leave Brittany for a 40-day endurance cruise in the Atlantic. They are improved copies of the *Redoutable* and *Vengeur,* which accomplished last year a 10-week cruise in the West Indies.

The *Henri-Poincaré* and *Poncelet* belong to the 1925 program, being contemporary to the British *Oberon* and anterior to the British *Odin* class, which have been in service for a few years. There are afloat, in the various stages of completion and trial, no fewer than 20 similar boats. They have plenty of qualities on paper and otherwise, but are the effect of a faulty policy going counter to Admiral Gervais's famous motto: *Une cannonière en bois prète à faire feu vaut mieux qu'un cuirassé en chantier: la simplicité et la robustesse sont les principales qualités du navire de combat.* The 9 submarines of the 1,000-1,450-ton *Requin* class (1922-23 program) are perfect boats; they were designed by practical men and ordered when the designs were ready in every particular. They were quickly built and put into service, where they have given great satisfaction. Such sensible principles were not applied in the case of the subsequent submarines. Designs were completed and modified once the vessels had been ordered, the chief delays being due to a wish to embody in them the very latest technical improvements. As the wheel of progress is never halting it is a wonder that some of these much-perfected craft should be definitely put into service. It is a great pity; they will miss some progress! That *le mieux est l'ennemi du bien* is a wise French maxim; but the French forget to profit by it, so true it is that *Chassez le naturel, il revient à grand pas.*

Armament Report To The League of Nations

Times, London, September 14.—The secretariat of the League of Nations has received a numerical statement of French armaments, in the form of an *annexe* to the memorandum of July 17.

The forces stationed at home in 1931 amounted to 286,342 officers and men, as compared with 513,643 officers and men in 1921. Forces mobilized for the defense, if necessary, of over-sea territory, amount to 71,825 at the present moment. There were 313,588 troops stationed oversea in 1921; as compared with 231,405 at the present time. These figures include native troops, but not those in mandated territories, which account for a further 14,698.

The Navy consists of 57,129 officers and ratings, the home air force consists of 32,110, and the over-sea air force of 8,398 officers and men. These figures include one contingent of recruits for the regular forces. The total tonnage of the French Navy is at present 628,603 tons, not including 1931 units. The Air Force consists of 1,210 machines for home service, 637 in training schools, and 310 reserve machines. There are 395 aeroplanes and seaplanes stationed abroad, 62 now in process of being shipped abroad, 71 training machines, and three airships of 974 total horsepower.

In the budget for the financial year 1930-31, 8,655,779,000f. is provided for the maintenance of the Army, of which 2,505,005,000f. is for the troops oversea. The Navy accounts for 3,013,938,000f., and the Air Force 2,139,881,000f.

GERMANY

The Siege of Germany

Review of Reviews, New York, September.—(By Frank H. Simonds.) The German crisis and the disarmament conference are then only integral parts of a single problem. France is fighting to preserve the peace treaties. She is fighting against Germany on the one hand, and the Anglo-Saxon

countries on the other. And while there is little general appreciation of this fact in America, the whole French people are aware of the situation, and the vast majority are supporting their government. Thus any disarmament conference in the near future must necessarily be a battle ground. . . . Of course if Germany surrenders before February another situation will arise. On the other hand if the nationalists come into power in Germany, then there is an end of all talk of disarmament for a very long time.

Equality For The Reich

Associated Press.—Geneva, September 12.—Dr. Julius Curtius, Foreign Minister of Germany, declared before the League of Nations assembly today that Germany no longer may justly be held to the armament restrictions of the Versailles Treaty while France and other war winners are free to equip themselves with extensive fighting forces.

French Figures

Revue des Deux Mondes, Paris, August 15.—(By Victor de Marce.) The Reichswehr budget, which amounted to 459,000,000 reichsmarks for 1924-25, rose to 763,000,000 reichsmarks for 1928-29, an increase which is explained by large increases of armaments. The credits have made it possible to effect the following increases:

	Maximum under Versailles Treaty	*Quantity corresponding to credits*
Rifles and other hand weapons	102,000	343,000
Machine guns	1,926	24,840
Cannon	288	2,757
Mine throwers and bomb throwers, medium and light	252	2,371

The German armies of invasion in 1914 had 5,236 machine guns, 9,192 cannon, 160 mine throwers, so that German armaments at present, except for cannon, are much greater than at the beginning of the war—in particular approximately five times as many machine guns.

Armament Report To The League of Nations

Times, London, September 10.—The figures given under the heading "Land Forces" correspond approximately to the totals allowed by the peace treaty—the total effectives being 100,500. "None" is entered under the heading "Formations Organized on a Military Basis."

The total of effectives in the naval forces is given as 15,000, and the global tonnage as 125,780. The capital ships in service are all over twenty years old. The two "pocket battleships" are entered as still under construction. Germany has four cruisers in active service, one in reserve, and one under construction. She possesses no aircraft carriers. She has vessels aggregating 46,810 tons exempt from limitation, the chief item under this head consisting of 29 mine sweepers. Every table referring to "Air Armed Forces" is filled in with the word "None."

ITALY

French View of Italian Building

Times, New York, September 20.—(Dispatch from Paris, September 19.) When the basis of agreement between France and Italy for the limitation of their naval building programs is being decided upon, it should be taken into consideration that Italy has greatly speeded up and intensified her naval construction recently, especially as regards cruisers and airplane carriers, it is stressed in apparently inspired editorial comment which appears in this morning's *Matin.* The paper will say:

> In other categories we will reduce on a reciprocal percentage basis our annual building program, but how will we arrive at this reciprocal percentage basis? In working out this percentage basis we must insist that the building programs carried out heretofore for a sufficiently long period of time be studied and taken into consideration.
>
> Italy has made a considerable effort in all categories, but particularly with cruisers and airplane carriers, in the last few years, and if this recent construction is not taken into consideration we would be placed at a disadvantage. The superiority of Italy's cruiser strength over ours would be assured.

JAPAN

The Extreme Right Threat

The following are extracts from an article by Frank H. Hedges in the *Sun,* Baltimore, September 23.—There exist twenty, perhaps more, organized groups of political ruffians in Japan who delight in calling themselves *ronin.* The *ronin,* or "wave man," of feudal Japan was a warrior *samurai* who had been cast out of his clan for some misdemeanor or worse, or who had found himself without clan and overlord because of some punish-

ment visited upon his lord. These *ronin* wandered about the country as armed free lances, as a curious Japanese analogy to the knights-errant of medieval Europe. . . . As time passed and Japan adjusted itself to the modern world into which it had been so precipitately thrust the need for such men ceased to exist. The bands of *ronin* did not, however. They changed in character and activity. No longer were they guided by a genuine desire to serve the emperor and Dai Nihon, but they evolved into little groups of political rowdies, ready to stage a demonstration, a brawl, or an assassination for whatever politician or political party would pay their price, always loudly proclaiming that they acted from the highest of patriotic motives. . . .

Their methods were, and are, frankly terroristic. . . .

The first public attack on these *soshi* (an unpleasant name which has gradually supplanted the more honorable one of *ronin*) so far as known to me was made by the American owned and edited newspaper in Toyko, the *Japan Advertiser,* early in 1924. Since then other newspapers published in the Japanese language have spoken forth in denunciation, and there have been a few arrests and trials of *soshi.*

Gross Injustice

Naval and Military Record, Plymouth, September 9.—(By Sir Herbert Russell.) The great powers are too preoccupied with insolvency to contemplate war just now. But is insolvency a guarantee of peace? When I was in Japan a personage of some eminence in his country remarked to me, over a cup of saki which probably thawed his characteristic reticence, that there was something very wrong in the unequal distribution of wealth in the world; that it was a gross injustice that Japan should be so very poor and the United States so very rich. It was a mere casual remark and we passed on to other matters, but it left a deep impression on my mind. The wars of old were mainly fought from greed. However, an American statesman has "outlawed" this; dollars are not worth fighting for, and yet the United States means to have the biggest Navy in the world.

The Manchurian Trouble

Times, New York, September 22.—At Tokyo we have the extraordinary spectacle of the Foreign Office and the War Office openly at odds. An Associated Press dispatch speaks of the problem that has thus arisen as the most acute in years. From the Foreign Office came the pledge, shortly after the seizure of Mukden, that the city would be evacuated without loss of time. From the War Office emanates pressure for the dispatch of reënforcements to Manchuria because of the alleged spread of anti-Japanese demonstrations.

Armament Report To The League of Nations

Times, New York, September 19.—Japan gives only 6 printed pages of data, where the United States used 18 and Britain 53 for the same tables. She limits herself nearly always to global figures, and save for naval material, furnishes practically none of the details requested. This reserve is especially marked in aviation and in expenditure in general.

Total Japanese land effectives are reported as 259,304, including 17,343 officers, as representing all those in active service and the first and second reserve lists. She fails to say how many troops are overseas, and answers none of the other questions under this heading.

Japan reports 6,944 military air and 9,877 naval air effectives, and 88,199 naval effectives, including the foregoing naval aviators. She fails to say how many officers are among these air and naval effectives.

Regarding air material she reports 838 army planes, including 254 in reserve, but excluding 300 more it is announced she proposes to build. Horsepower is not specified.

Naval planes are reported as 801, with a total of 519,490 horsepower, including 329 planes with aircraft carriers and warships. A footnote explains that the naval air figures include building projects, but fails to say how many of these planes are on paper and how many real. It is also explained that training and experimental planes are excluded from all figures, save with regard to those on board ships, but the number of these school planes is not given.

Global naval tonnage is put at 850,328 tons, and the same details are given as by the United States. Exempt vessels total 281,093 tons. Japan, like the United States, divides her ships merely into categories—with her they number 11—and gives the

armament, tonnage, age, speed, and name of each exempt unit, as Britain did.

Japan gives the total expenditures for the fiscal year ended in March, 1930, for land armed forces as $113,627,000 and $133,832,000 for the Navy Department. No figure is given for aviation, but footnotes explain that the naval figures include aviation, and land figures include "various" aviation items, but not army air material, for which no figure is given.

Expenditure for army material excluding aviation is given as $16,375,000, but none of the other numerous questions regarding war expenditure is answered.

The armament figures of the United States, Great Britain, and Japan as sent to the council of the League of Nations, are:[1]

	United States	*Great Britain*	*Japan*
Land effectives*	139,957	144,522	259,304
Naval effectives†	109,886	96,042	78,322
Air effectives	27,324	30,118	16,821
Global naval tonnage	1,251,847	1,250,247	850,328
Total expenditure,‡ land, sea and air, for year 1929-30	$835,819,460	$526,486,500	$247,459,000

*British land effectives exclude 60,000 British troops in India, all native troops in colonies, and forces in dominions. Japan does not report how many troops overseas.

†British figures for naval effectives exclude dominions belonging to the league and also India.

‡In her figures for total armament expenditure Britain excludes the dominions, all of the colonies and India. Japan apparently does not give her full aviation expenses, according to information from Geneva.

RUSSIA

Five-Year Plan

Western Society of Engineers *Bulletin*, Chicago, September 15.—The greatest thing in Russian industry is the Five-Year Plan, which contemplates the erection of 518 new industrial plants of all sorts, and some 1,044 service stations in connection with collectivized and state farm operations. Some are completed and turning out goods of rather indifferent quality. Others are built and equipped, but are paralyzed by the lack of training of the workers and unable to achieve the production for which they were designed. Some are producing at full capacity. Everywhere politics enters into management with varying results, as might be anticipated.

Soviet Air Forces

M. M. Nosinski in an article in the Chicago *Tribune* of September 27, says that Russia now has 41 airplane factories with about 150,000 workmen, officials, and foreign instructors, and that their product is excellent. The air force of Russia today includes almost 50,000 persons. There are 25 military aviation schools.

Naval and Military Record, Plymouth, August 26.—Further additions are announced to the strength of the Russian Air Force, including a giant airplane carrying 44 passengers, and driven by 5 engines with a total power of 2,400 hp.

This giant machine is to be formally presented to the Soviet Union by the Central Aëro and Hydro-Dynamic Institute on the fourteenth anniversary, in October, of the Russian Revolution. The Institute claims that with the presentation of this airplane Russia will have surpassed England, the United States, France, and Japan, as the only two other machines of this type are owned by Germany and Italy.

The Soviet Press also announces that the Red Air Force has been strengthened by the addition of 19 airplanes built out of funds subscribed by the workers of the Soviet Union and the Osoaviakhim organization (the Aviation and Chemical Defence Society). Each of the airplanes has a commemorative name, such as *Osoaviakhim*, *The Second Five-Year Plan*, or *The Pacific Ocean*.—Reuter.

Army Maneuvers

Herald Tribune, New York, September 20.—(From Moscow, September 19.) Soviet Russia's Red Army began annual maneuvers today which extended to all parts of the Soviet Republic. Local populations of frontier regions coöperated in defense against "enemies."

The entire population of Leningrad continued a 5-day rehearsal of defense against air attacks by bombs and poison gas. The populace was warned of a gas attack by

[1] These figures for the United States are misleading in that the 27,324 air effectives are also counted in the army and naval effectives, and the total expenditures are over $100,000,000 less, due apparently to counting air expenditures twice.

screaming of sirens and radio broadcasts. At the warning signal people rushed to cellars and donned gas masks, all stores and shops were closed and work ceased until the theoretical danger was passed.

The press warned that Leningrad was most likely to be the first objective of Soviet "enemies." The message that the city must be ready to defend itself was repeated on placards and billboards.

To Annex Europe

Tribune, Chicago, September 28.—(By Donald Day.) Ozols, a leading authority in northeastern Europe on Russia, said Moscow is gradually alienating Russia from Europe, and that activities of Soviet diplomats at Geneva and other European capitals are intended to increase discords between European countries.

The Bolsheviks' present 5-year plan and the coming 5-year plan are designed to prepare Russia for war against Europe. When the differences between European countries finally result in conflict, Russia also will start military action. The mistake of foreign countries is to think that Russia only has designs against the Baltic states. Commissars informed me in Moscow that they don't want the Baltic states but they do want to annex Europe.

I can assure my country, Europe, and America that Moscow commissars have now even greater hopes of a world revolution than ten years ago, and under communist leadership Russia is preparing for war against Europe and the rest of the world.

CHILE

Naval Mutiny

Naval and Military Record, Plymouth, September 9.—The Chilean Fleet is British-trained, and has hitherto been a model of order and obedience. . . .

The British Ambassador announces that all the British officers lent to the Chilean Navy for training purposes are safe either at Valparaiso or at Talcahuano. There are none in the rebel warships. . . .

The *Almirante Latorre* (formerly the British battleship *Canada* and recently refitted at Devonport) was also hit, but she flashed back a reply from her anti-aircraft guns and struck one of the attacking planes.

. . . It appears that the rising of the fleet was chiefly due to the proposed reduction in pay. Two Communists are stated to have been among the rebel ringleaders, who had apparently persuaded the sailors that their action would be supported by the land and air forces.

Times, London, September 11.—In spite of the precautions of the British authorities it appears that Communist agents working under instructions from Moscow and Berlin established contact with Chilean sailors while the battleship *Almirante Latorre* was being reconditioned at Devonport. The rebellion is attributed exclusively to Communist elements, whose numerical strength among the sailors was steadily increasing. The stories to the effect that the insurrection was due to excessive oppression of the sailors by warrant and petty officers are unfounded.

On the afternoon of August 30 a boxing match took place on board the cruiser *General O'Higgins* at which parties from all the other ships were present. This provided the ringleaders of the mutiny with an occasion to take the decision to mutiny which ended so dramatically. The seizure of all the ships and the confinement of the officers by boatloads of armed rebels from the *Almirante Latorre* were carried out in the small hours of Monday morning; the watches of the other ships were overpowered, resistance being threatened with instant death.

THE NETHERLANDS

Armament Report To The League of Nations

Times, London, August 27.—The strength of the Army in the Netherlands in 1930, excluding the air force, averaged 16,293, including 1,568 officers, and that of the Army in over-sea territories 39,083, including 1,130 officers. The strength of the Navy, excluding the air force, in 1930 averaged 8,613, including 695 officers, and that of the air force in the Netherlands for the Army and Navy together 809 men, of whom 405 belonged to the Army and 404 to the Navy. On the other hand, the air force in the over-sea territories (Army and Navy together) comprised 688 men, of whom 262 belonged to the Army and 426 to the Navy.

The Dutch Navy, so far as it is covered by the Draft Convention, consists of three battleships, two light cruisers, and one projected light cruiser, together with destroyers and submarines.

The land and naval air forces had 321 aircraft (205 in the Netherlands and 116 in the Dutch East Indies). This total included 48 reserve machines, 61 instructional machines, and two ambulance machines.

Finally, the return of the Dutch Govern-

ment gives particulars of the period of service of the conscripts with the colors. This period for men liable for service in the Army in the Netherlands (except those to be trained as non-commissioned officers or as officers) is 7 months, including refresher courses. The greater part of the contingent have the shortest period of service—only 205 days.

NAVAL NOTES

The following notes are taken from various sources.

United States

Bids for ten destroyers, authorized in 1916, were opened on September 16. Seven firms submitted bids ranging from $2,380,000 to $3,804,982. The least time required was twenty months. On September 29 the Navy Department announced awards of one destroyer each to Bath, Quincy, and the yards at Boston and Puget Sound. One destroyer had previously been assigned to the New York yard. The Department's announcement concluded:

> It is not possible to place orders at this time for the construction of the six remaining destroyers for which bids and estimates were received on account of the necessity for limiting budget expenditures during the current fiscal year.

The budget drawn up by the Navy Department for next year provides for a force of 16,000 marines as compared with 17,500 at present.

Tests on the old cruiser *Pittsburgh*, to be conducted in Tangier Sound from October 5 to 20, are to consist principally of the dropping of dummy aërial bombs to determine penetration, and the setting off of static explosive charges to determine destructive effect.

The Chinese river gunboats *Palos* and *Monocacy* have been commissioned for flood relief work.

The keel of the *Tuscaloosa* was laid the first week in September at the Camden plant of the New York Shipbuilding Corporation.

The keel of the *San Francisco* was laid at the Mare Island yard on September 9.

The U.S.S. *Akron* made her first flight on September 23 with 113 persons aboard.

Two squadrons of Marine Corps planes are to be assigned as part of the regular complements of the *Saratoga* and the *Lexington*.

On September 23 bids were opened for the construction of a hangar at Sunnyvale, California, to be capable of housing one airship of 11,000,000 cubic feet. The capacity of the *Akron* is 6,500,000 cubic feet.

Great Britain

The Prime Minister announced in Parliament on September 11 that the *R-100* would be disposed of and that the Cardington air station would be put on a care and maintenance basis.

The cruiser *Kent* has left England for duty as flagship of the China station.

The Fourth Submarine Flotilla on the China station comprises 11 of the 18 submarines added to the British Navy since the war.

The reconstitution of the Eighth Destroyer Flotilla on the China Station has now been settled. The *Keppel* will replace the *Bruce* as leader. In the Fifteenth Division, the *Wild Swan* will relieve the *Serapis;* the *Witch*, the *Seraph;* the *Veteran*, the *Sepoy;* and the *Whitehall*, the *Stormcloud*. In the Sixteenth Division, the *Verity* will relieve the *Thracian;* the *Wren*, the *Sterling;* the *Wishart*, the *Somme;* and the *Whitshed*, the *Sirdar*.

For the time being the Royal Canadian Navy includes four destroyers in commission, the old vessels *Champlain* and *Vancouver*, which are to be scrapped shortly, and the new units *Saguenay* and *Skeena*, recently completed by the Thornycroft firm at Southampton. The two stationed on the Atlantic side at Halifax, N.S., have recently made a cruise. The *Champlain* went to Louisberg to met the *Delhi*, flagship of the Imperial Squadron on the America and West Indies Station; and the *Vancouver* to Charlottetown, Prince Edward Island. It is not yet known whether the older destroyers on being placed out of service will return to England or be broken up in Canada.

The New Zealand government announces that future engagements or re-engagements of Royal naval officers for service in the New Zealand Division of the Royal Navy will be at the same rates of pay, allowances, and conditions as those appertaining to the Imperial Service.

The destroyer *Acheron*, the first to be fitted with high pressure steam, is due for completion on October 13. She is to be attached for the time being to the Atlantic Fleet as an additional destroyer.

The cruiser *Leander* was launched at Devonport on September 24.

The cruiser *Sussex* is to be refitted in Chatham before recommissioning for further service in the First Cruiser Squadron.

The new sloop *Fowey* was commissioned on September 9 as an independent command for service in the Persian Gulf.

The battleship *Iron Duke* is ordered to arrive at Devonport about mid-November to pay off into dockyard control. The *Iron Duke* serves as seagoing gunnery firing ship, and for nearly two months has been at Rosyth. She is to be demilitarized under the London treaty, but will continue to serve as gunnery training ship after her armament and warlike stores have been removed.

There are now 236 captains on the active list as compared with 249 five years ago.

Rear Admiral Richard A. S. Hill, C.B.E., hoisted his flag in the *President* on the morning of August 28 and struck it that evening. This was in accordance with the usual custom, to signify his restoration to full pay. Rear Admiral Hill has been appointed senior naval officer in the Yangtze.

Extensive explosive tests have been conducted in the old battleship *Marlborough* in Plymouth Sound.

The *Malaya* and the *Warspite* recommissioned in September for service in the Second Battle Squadron of the Atlantic Fleet.

The aircraft carrier *Eagle* paid off into dockyard control at Devonport the last of August for large repairs. The sum of £146,496 for this work is carried in the current naval estimates.

The autumn program of the Atlantic Fleet (called off on account of the "unrest") was to have consisted of operations to the eastward of Scotland, with main base at Invergordon.

France

The destroyer *Milan* will be launched at St. Nazaire on October 13, ten and a half months after being laid down.

On September 7, the Army and Navy began coastal defense tests centering on La Rochelle. Senegalese colonial troops and colonial artillery assisted in the defense. The attack was made by the fleet under Vice Admiral Chauvin.

When in October combined sea training is resumed on more realistic lines the commander in chief, Admiral Robert, will have under his direct command the four reconstructed battleships *Lorraine, Bretagne, Courbet,* and *Jean Bart,* all good for 19 knots at sea, the *Courbet,* slowest of the 24,000-ton series, having been reboilered and thoroughly revised. A fifth 24,000-ton cuirassé, the *Paris,* also modernized, will be immediately available, with practically full complement on board, as flagship of the division d'instruction under Admiral Castex.

Italy

The 10,000-ton cruiser *Zara,* launched April 27, 1930, carried out its first trials in June at speeds of from 21 to 33 knots. Its displacement was 11,280 tons. This cruiser is slower than the preceding class, but better protected.

The destroyer *Fulmine* of the 1929 program was launched on August 2 at Fiume. The *Fulmine* has a speed of 38 knots and a displacement of 1,220 tons.

The submarines now in construction have received the following names: *Diamante* and *Esmeralda* for those built at Tarento; *Rubi* and *Topacio* for those at Fiume; *Amatista* and *Zafiro* for those built at Spezia; *Sirena, Nayada, Nereida, Anfitrite, Galatea,* and *Ondina* for the units built at the yards of Monfalcone.

Japan

A serious gasoline explosion occurred in the *Notoro,* a special service ship attached to the First Aircraft Squadron at Yokohama on September 5.

Argentina

The submarine *Santa Fé* was launched at Tarento, Italy on July 19. Characteristics: 775 tons surface, 920 submerged; speeds 17.75 and 9 knots; one 4-inch gun and six 21-inch tubes.

Spain

The battleship *Alfonso XIII,* the cruisers *Reina Victoria Eugenia,* and *Príncipe Alonso* have been renamed respectively *España, República,* and *Libertad.*

MERCHANT MARINE

The New Cunarder

Sun, Baltimore, September 5.—Word has been received that work on the $30,000,000 superliner has progressed to a point where it will be launched in February and completed in time to make a voyage next summer.

The ship will be 1,018 feet long—about

the dimensions of the Empire State Building; will be 73,000 tons gross and have a beam of 115 feet. She is known at present as "Hull 534."

High pressure superheat turbines, generating 200,000 horsepower, will drive her at an estimated speed of from 32 to 35 knots, enough to enable her to make the Atlantic crossing in 4 days flat. If she does the distance in a few minutes less than this, she will make it possible to sail from New York on a Friday morning and reach the English channel on Monday.

For the first time in the history of shipbuilding the Cunard Line has disregarded the dimensions of the Panama Canal and is building a vessel that will be unable to negotiate that waterway, which is capable of accommodating in its locks vessels up to 1,000 feet in length and of a maximum beam of 115 feet.

The new Cunarder is one of two sister ships which the company plans for its transatlantic express service. The keel of the second vessel is expected to be laid some time next year, and when both ships are in service the line will be able to maintain weekly express sailings with them from New York, Cherbourg, and Southampton, as the great speed of the vessels will enable them to do the work of the three big but slower ships which the company is now operating.

The new Cunarder will accommodate 5,000 passengers. Shipping men believe that the company is not only aiming to absorb the weekly express passenger carryings, but those of several of their smaller vessels which maintain weekly sailings.

No name has been announced for the new vessel, but it is understood that "Britannia" is favored by many in Great Britain. *Britannia* was the name of the Cunard Line's first vessel, which opened the company's transatlantic service 91 years ago last July 4.

National Merchant Marine Academy

Nautical Gazette, New York, September 19.—. . . Assistant Secretary of the Navy Ernest Lee Jahncke suggested the utilization of Naval Academy graduates as merchant officers. But the shipping fraternity did not welcome this suggestion very enthusiastically. . . . The Navy, in spite of the ten-to-one opposition to Naval Academy graduate scheme, has succeeded in having the following additions made to the 1931 "Rules and Regulations" of the U. S. Steamboat Inspection Service:

Qualifications for Third Mate of Ocean Steam Vessels

(a) Any applicant who has had three years' training at the U. S. Naval Academy and who has had not less than two training cruises.

(b) A graduate of the Naval R.O.T.C. who has served six months in the deck department of ocean or coastwise vessels.

Qualifications for Second Mate of Ocean Steam Vessels

(c) Any graduate of the U. S. Naval Academy who has had not less than three training cruises.

In addition to providing the merchant service with Naval Academy and R.O.T.C. graduates, the Navy has another idea which seems somewhat conflicting. Admiral F. B. Upham, of the Bureau of Navigation, in circular letter 56-31, dated June 24 and addressed to all ships and stations, states:

> 1. There is a field for trained men in the U. S. Merchant Marine. The Bureau of Navigation desires to open this field to ambitious enlisted men of good character and satisfactory naval service.
> 2. Enlisted men who desire to try for an officer's billet in the merchant marine and still hold their standing for reënlistment in the regular Navy may do so. . . .

Subsequent paragraphs in the admiral's letter give detailed information concerning procedure and examinations for third mates and assistant engineers. The good admiral, apparently aware of the ease with which a steamboat inspection license may be obtained, encourages his wards with, "Examinations are given at any time an applicant appears, and rarely require more than four days." It is wondered if the admiral, in constructing the above brilliant thought, stopped to contemplate a happy merchant vessel having an enlisted man for master, an Annapolis graduate for chief mate and an R.O.T.C. as third mate.

Not to be forgotten in the Navy's program to "improve" merchant officer personnel is that clause of the Act of 1928 which permits the employment of regular Navy officers on mail contract vessels. On this point it may be of interest to know that Great Britain permits her Royal Navy officers a merchant officer certificate, but such is merely of honorary character, having no utility for employment on merchant ships.

But rules and practices of the British Board of Trade and Admiralty are not as of our Steamboat Inspection Service and Navy. Britain has an efficiently trained Royal Naval Reserve, whereas we merely have a body of non-naval-trained merchant officers with naval commissions. In working up its plans for reserve strength and the utilization of merchant officer personnel during periods of national emergency it appears obvious that the Navy has definite ideas.

If the Navy has its plans to improve officer personnel, then so should the employers of these officers during periods other than national emergencies. These shipowners should be vitally interested in the development of two state nautical schools which have recently shaken the almost universal belief that future merchant officers must receive their training on barkentine-rigged gunboats propelled by coffee-grinding engines. The advance in nautical school training made by these two state schoolships during the past few months, coupled with continued development which may be expected of them in the next few years, forms a sound basis for the prediction that one of them will eventually become the National Merchant Marine Academy. Because of this likelihood the shipping fraternity should be interested in knowing what the new California Nautical School and the New York State Merchant Marine Academy are doing.

Various Notes

The SS. *Empire State* formerly the U.S.S. *Procyon* was turned over to the state of New York on September 21 for use as a merchant marine school ship. This will mark the passing of the old *Newport*, for long under the command of Captain Felix Riesenberg, seaman and author.

The new Welland Ship Canal, connecting Lake Erie with Lake Ontario, though not fully completed, has already begun to exert a radical influence on the type of shipments to Lake Ontario ports from points on the upper lakes. The first shipment of iron ore to be moved entirely by water from a Lake Superior port for the Steel Company of Canada, arrived recently by the large lake cargo ship *Collingwood*, which, in addition to being the first steamer to carry ore to Hamilton, was also the largest cargo carrier ever to enter the port. The vessel is 386 ft. long, and with her full cargo of 6,000 tons, draws 18 ft. of water, the maximum draught which the Welland Canal at present allows.

A land and water ovation greeted the ocean-going freighter *Anna* as it docked at Chicago; inaugurating a regular export and import traffic, and thereby making history for Chicago as an ocean port. The *Anna*, about the size of the Lake Michigan steamer *Theodore Roosevelt*, sailed from Antwerp, Belgium, and brought a cargo of 1,550 tons of fencing wire and farm implements. It came across the Atlantic, through the St. Lawrence River, the Welland Canal, Lake Erie, and Lake Michigan.

Port Houston, gateway of the southwest, showing another epochal increase in the volume of tonnage moving over its wharves in foreign trade achieved an enviable record during 1930, advancing to the position of sixth port of the United States in total foreign commerce.

The Cunard liner *Carmania* is to be scrapped. She is of 19,000 tons and was built on the Clyde in 1905. It will be remembered that in 1914 she had a duel with another armed liner, the *Cap Trafalgar* and sank her.

A $9,000,000 dry dock, expected to be the largest of its kind in the world, is to be constructed at Southampton, England, to hold Britain's new 73,000-ton ocean liner. Construction is to begin at once, the British Southern Railway having awarded the contract to a prominent London engineering concern which will work in conjunction with a Manchester firm. The combination of the two firms is designed to expedite the work so that it will be ready for the giant liner which is already well under way.

Two new motorships to have a speed of 18 knots and to cost $4,000,000 each will be built soon by the Osaka Shosen Kaisha for use in the line's Yokohama-Los Angeles-New York service.

On September 16 the Shipping Board authorized loans of two-thirds of the construction cost of two 16-knot passenger-cargo liners for the New York-West Indian service of the Colombian Mail Steamship Corporation of New York.

The motor tanker *White Flash*, of 550 gross tons, built for the Atlantic Refining Company, of Philadelphia, was launched September 10 from the yard of the Sun

Shipbuilding and Dry Dock Company, Chester, Pennsylvania. The vessel is of welded construction throughout, length 190 feet, beam 34 feet, and depth 12 feet. She has engines developing 500 hp.

American shipbuilding costs are estimated at 80 per cent higher than German or Danish.

SCIENTIFIC

Political Aspects of Mineral Resources

Journal, Western Society of Engineers, Chicago, August.—(From lecture by Dr. Charles K. Leith, Professor of Geology, University of Wisconsin.) It will take a great many years before Russia can even catch up with its own requirements and there is not yet in sight with any certainty supplies other than those now exported, which will make Russia figure in the world picture, in the international movements of minerals, and in the maneuvers that are now going on in reference to those international movements.

We hear a great deal about the Five-Year Plan in Russia. I have taken occasion to find out what the plan is with reference to minerals. A good deal of fear is expressed that if the Russians succeed with the Five-Year Plan, the result will be world depression with regard to those particular industries. Granting the success of the Five-Year Plan in regard to minerals, it will not change the world's situation. In no particular case will it essentially disturb the perspective. . . .

To make a long story short, no competent engineers who have gone over that situation —and many have, many times—have yet been able to find any combination of mineral resources which warrant the hope of a development of any industrial civilization at all comparable to that of western Europe or to that of the United States. China has abundant coal, only part of which is of good coking grade. It is reported also to have a great deal of iron ore, but about this there has been a great deal of misinformation and, when you come to sift it down, you will find that all the iron ore in China, if used on the scale of the United States, would keep the furnaces supplied for only two years; and furthermore, there doesn't seem to be much chance for extension. . . .

Japan lacks both iron and coal. Japan has about enough copper to supply itself. Japan is making tremendous efforts to supply its mineral demands on the Asiatic coast. The Japanese activity in China plays a very important political part. They got control of the iron ore deposits on the Yangtze River. They are not doing anything with them now, but even if they had them, they are too small to figure largely. Japan is making tremendous efforts to develop iron ores in Manchuria, but against heavy odds; the ores are of very low grade.

There are iron ores of a low grade in the Philippines and in adjacent portions of the Dutch East Indies, but the grade is such that it presents very great difficulties. Coking coal is absent.

India has a very important group of iron ore deposits, very large, very rich, very recently discovered, but the coking coal is limited, and the best estimates of the life of the coking coal, even on the present very limited scale of production, give a life of 40 years, which means that the situation is too restricted for the development of a very large industry.

If it were possible to forget all the political lines and to bring together the coal of China, the iron ore of India, with the lead and zinc of Burma, and so on, it might be possible to develop a very respectable industrial unit, but the political difficulties involved are obviously very great indeed and hardly a step has been taken in that direction yet, although let me say that commercial interests have been very much ahead of political interests in investigating just those possibilities, and even making tentative steps in the way of bringing some of those possibilities to the front. . . .

So far as industrial strength is necessary to fight the modern war, it would seem as if the center of power is bound to remain in the North Atlantic, which may seem to be a sweeping statement, but detailed analysis of the capacity to sustain a long war seems to warrant a statement of that sort. Any nation may start a war; we are talking now about the capacity to carry on a sustained war under modern conditions, and from that point of view the peril from Asiatics rather fades into the background. They are up against a serious raw material situation, one which they keenly realize and one which has to be minimized by people who like to play up these bogies. What they need, instead of war preparations in expectation of trouble from that quarter, is sympathy and help in their very difficult struggle to get

the natural resources, to coördinate them and to assemble them. . . . I think there is substantial basis for the conclusion that there has already developed a considerable plexus of international political understanding for the control of the world's minerals. . . .

It is interesting to speculate, if these are salient tendencies—and I think they are—what their effects may be on questions of future peace between the nations. At first thought, it would seem as if a tendency to internationalize mineral resources, both commercially and politically, would be in the direction of peace, but I think that perhaps is a Utopian view, because we are a long, long ways from unification commercially or politically. As the units get larger, their areas of contact become smaller but the intensity of the conflict becomes greater, because very much larger units are involved. While these conflicts are ultimately adjusted, there are fireworks while they are being adjusted.

Centrifugal Casting of Guns

Engineer, London, August 28.—An account of the casting . . . by the centrifugal process, and the many advantages claimed, are discussed in an article by Colonel T. C. Dickson, of the Watertown Arsenal, Massachusetts, in the *Iron Age* for June 4. By this process, guns can be made in one piece, exclusive of breech ring and breech mechanism, and can be cast at about two-thirds of the cost of forging an ingot. . . . Colonel Dickson . . . considers that 16-inch guns, weighing over 100 tons, would be produced in this way in the future.

LIMITATION AND THE LEAGUE

Foreign Policies

With its October issue, *Foreign Affairs,* quarterly of New York, presents the fourth of a series of articles on foreign policies. This last article is on the United States and is by John W. Davis. The preceding articles, by equally eminent men, were on France, Germany, and Great Britain. The *Herald Tribune,* New York, of September 28, comments editorially:

> One word runs through every paper in a similar refrain—"security." . . . The trouble is that the word is too loosely used; when a nation demands security it wants protection not only against wanton attack but against interference in activities which it feels are right and legitimate, but which some other nation may feel with equal force to be wrong and selfish. This kind of security can be guaranteed to one or another power, but scarcely to two at once. It is the dilemma of the past decade of international history.
>
> It is possible that there is no solution for it. On the other hand, it is also possible that development will slowly bring the nations to a realization of the existence of common interests so strong as to dissolve the particular fears and narrower demands for "security." When that happens the organization of peace may come within the range of practicability; for then the nations will be wanting security not against one another but against less tangible foes common to all. Unhappily, that has not happened yet.

China and the League of Nations

Tribune, Chicago, September 29.—China's first step when Japan began the occupation of cities in Manchuria, driving Chinese troops and officials out, was to appeal to the League of Nations at Geneva. . . . China got nothing at Geneva from its fellow-members but a cold stare. . . .

China has documentary protection all over the place, the covenant of the league, the Kellogg peace treaty, the consultative pact entered into at the Washington conference. China has joined and signed everything that internationalism could produce, but it has not developed the power in itself to protect itself, and the pacts do it no good.

The worthless League of Nations reaffirms its futility every time it is confronted with an obligation out of its covenant.

Arms Parley Head

Times, New York, September 3.—(From Geneva, September 2.) The question has been raised in serious European quarters here as to whether it would be possible for Charles Evans Hughes, Chief Justice of the Supreme Court of the United States, to accept the presidency of the world disarmament conference should Arthur Henderson, former Foreign Minister of Great Britain, resign the position.

Head of American Delegation

United States Daily, Washington, September 11.—The question of who will head the American delegation to the general disarmament conference in Geneva next February has not yet been discussed, according to an oral statement by the Secretary of State Henry L. Stimson, made September 10 in reply to inquiries.

Secretary Stimson, when asked whether he would head the American delegation, said the question had not been gone into,

but it was not to be inferred that because he favored trips abroad for American secretaries of state, he thought they should stay abroad all the time.

Japanese Delegation

Times, New York, September 5.—(From Tokyo, September 4.) Japan's delegation to the disarmament conference at Geneva in February was completed today following the acceptance of the leadership yesterday by Tsuneo Matsudaira, Japanese Ambassador to Great Britain.

The others are M. Sato, Ambassador to Belgium; Lieutenant General Matsui, commanding the Eleventh Division, and Vice Admiral Nagano, Vice-Chief of the General Staff.

Ambassador Matsudaira delayed acceptance for more than a week, presumably for the reason that his near connections with the imperial family made him hesitate to accept a mission which might lead to political disputes in Japan.

Foreign Minister Shidehara, who was a possible alternative, cannot be absent during the session of the Diet in February.

AVIATION

Japanese Air Regulations for Foreign Aircraft

Department of Commerce, September 4. —The date and hour of the arrival of any aircraft must be reported at the earliest possible time. When flying over Japanese territory laws and regulations governing aviation in Japan must be observed. No explosives, military weapons, ammunition, nor cameras may be carried. It is prohibited to fly over fortified zones and areas as well as over naval ports and auxiliary naval ports.

The route to be followed for flights to Japan from transpacific points is: From the southern end of Kamchatka along the eastern side of the Kurile Islands, via Ochiishi to Erimosaki, and eastward of 141′ 40″ east longitude over the sea directly to Miyako thence along the coast railway line from Mito to Tachikawa. Flight over Tokyo is prohibited unless permission has been granted by the police department of the city. Application for permission must be made one week in advance of any such flight. The Tokyo airport located at Tachikawa Machi, Tama Gun, Tokyo Fu, shall be used. It may be difficult to secure effective aid if a forced landing is necessary north of Miyako.

Flights to Japan from the Asiatic continent shall be made as follows: From Shingishu to Heijo, Keijo, Taikyu, the vicinity of Urusan, Kadoshima, Hiroshima, Osaka, Kozu or to the northwest via Atsugi, to Tachikawa. Flying fields on the route where landings may be made are: Keijo, Urusan, Osaka or Tokyo airports. Emergency landing fields are located as follows: Flying field of the sixth aviation regiment at Daidoko Men, Heian Nando, Chosen; Taikyu, Hiroshima, and Okayama parade grounds and the flying field of the seventh aviation regiment at Hikiba, Hamana-gun, Shizuoka prefecture. At the first point of landing provision must be made for payment of customs duty on the airplane. If the plane is to remain on Japanese territory less than one year, a sum proportionate to the amount of duty payable shall be deposited in lieu of the customs duty, or arrangemnt may be made for the deposit of a guarantee for the amount of customs duty by a resident of the place.

When flying over Japanese territory, definite routes shall be followed. Instruction with regard to fixed routes and particulars of zones prohibited to aviators will be available from the chiefs of the landing fields. Notification of intention to depart from or arrive at the Tokyo, Osaka, and Keijo airports shall be made to the chief of the airport at least one week in advance and necessary instructions received from him. A request to land at the Nagoya and Sendai flying fields shall be made at least ten days in advance to the military officer in charge. Permission may be refused or canceled, or the date and time may be changed.

Aircraft Carrier and Flight-Deck Cruiser Tonnage

U. S. Air Services, Washington, D.C., September.—(By Charles L. Lawrence, President, Aeronautical Chamber of Commerce of America.) It is well known that it was only with great difficulty that the United States was able to prevent a reduction in carrier tonnage at the London Arms Limitation Conference. Certain powers sought to reduce it to 100,000 tons, arguing that the 135,000-ton limit was excessively high as evidenced by the fact that we had not built up to it. Having two ships with a total displacement of 66,000 tons, such a reduction

would place us in a position of permanent inferiority. In this connection, it should be remembered that Great Britain has about fifty merchant ships which could be transformed into satisfactory aircraft carriers. This country has about fourteen such vessels.

Naval students tell us that we must build up to the tonnage limit for aircraft carriers to forestall a reduction in this category when the next disarmament conference under the London treaty meets in the spring of 1935, and this is undeniably true. The issue may even be forced at the conference to be called next year by the preparatory commission on disarmament of the League of Nations. We may also expect a reduction in the percentage of cruisers that may be fitted with flight decks. All the weight this nation could bring to bear was necessary to force an agreement that 25 per cent, 80,750 tons, of the total cruiser tonnage, might be of the flight-deck type. I believe it is of vital importance to national defense that no further reductions be made in these categories.

As a result of its experience with the *Saratoga, Lexington,* and *Langley,* the Navy Department has reached a decision that the most efficient carrier is one of 13,800 tons. The *Ranger,* the first carrier of this size to be constructed by the United States, probably will be delivered in 1934. Navy officials have recommended the construction of four more vessels of the same displacement to fill the remaining 55,200 tons of carriers allotted to us under the treaties, thus providing the country with a total of seven useful carriers. We have been shown time and again that a paper navy means nothing. Construction work on these ships should be started without delay.

Naval Aviation Developments

Aviation, New York, September.—Navy plans for expansion of the aircraft establishment are developing. The thousand planes provided under the five-year program are considered as adequate for existing ships and shore stations. Henceforth the Navy Department wishes to increase the number to take care of new aircraft-carrying ships as they are launched, the authorization for each ship including the aircraft to equip it. Special interest therefore attaches to the department's recently-announced building program, probably to be submitted to the next session of Congress, which includes two new aircraft carriers and one carrier-cruiser of the never-previously-existing London treaty type. Furthermore, authorization will be sought for the early purchase of about 120 new planes to equip the aircraft carrier *Ranger,* now under construction. Net effect, if Congress and the President accept all this, will be to expand the Navy's air force from 1,000 to about 1,500 planes within the next four or five years, requiring total purchases, including replacements, of about 400 planes each year—somewhat more than the annual average over the last five years.

Attention of the Navy Department is now centered on providing for the study of designs for higher speed planes. The appropriation by Congress last July of $220,000 made it possible to take the first step, contracting for the development of a light weight, high-powered engine. Contract to the full amount of the funds available has been made with one of the largest engine manufacturers to undertake experimental work with water-cooled, chemically-cooled, and air-cooled engines to develop power plants of 600 hp. or more. Further research is projected to determine the most efficient aerodynamic form and to develop an engine of over 1,000 hp., that the American service may keep abreast of the foreign developments along these lines.

Commercial Aviation and the 1932 Disarmament Conference

Herald Tribune, New York, September 20. (Geneva, September 19.) Publicity for all information on commercial aviation promises to be one of the hardest problems of the 1932 general disarmament conference. In spite of all of the efforts, both of the league's preparatory disarmament commission and of the league itself, it has been impossible to find any basis of agreement on this point.

In the case of the Central Powers, that are not allowed to possess military aviation under the peace treaties, there is nothing to prevent them from building up commercial aviation on the most extensive scale. This, it is declared, could be converted overnight into military aviation that would entirely upset the supposition that these powers are unarmed and incapable of attack.

As it is generally conceded that aviation will probably be the most important armament in "the next war" leaguers recognize that a disarmament convention that does

not take into account the status of commercial aviation would create an entirely false idea of reduction of armaments.

In order to advance the question as far as possible before the disarmament conference meets, the secretariat has just requested all nations to notify it on what basis each prefers to have the question handled.

Italian Air Force Maneuvers

Army, Navy, and Air Force Gazette, London, September 3.—The Italian Air Force maneuvers were begun at midnight on August 26 with a series of mass attacks against Spezia by B force. Little is known of the part played by the defense, but it is generally accepted that it was overwhelmed almost at once by the attack, and that the day bombers were able to circle over the city almost unopposed and drop their bombs. This is somewhat surprising, as the weather was all in favor of the defense; the seaplanes from Orbetello failed to identify their objective because of the dense mist and discharged their bombs into the sea. The attacking force which came from the landward side of Spezia, however, had little difficulty in picking up its objective and dropped its bombs with great accuracy.

At the same time the A force made a successful counterattack on Ancona and dropped 300 bombs on that city soon after dawn. Two attacks, in which a total of 72 machines took part, were made within the space of 7 minutes.

The peak of the maneuvers was reached on August 30 when Milan was raided in the early hours of the morning, and again in the afternoon by mass formations. At one time it was possible to count some 300 machines in the air together, and the formation flying of the attacking aircraft was carried out with praiseworthy accuracy. Each attack lasted for at least an hour and as the bombers dropped bombs made of fireworks, which exploded only 100 feet or so above the housetops, the inhabitants of Milan had not only all the thrills of warfare, but were within measurable distance of suffering some of its pains and penalties as well.

The fact that in most cases the attacking force was able to defeat the defense was probably acceptable to the powers that be as it is said that the main object of the air maneuvers was to make the Italian nation airminded. The reports of the maneuvers certainly read as though they should have brought home to the population the desirability—if not the necessity—of possessing an air force strong enough to repel attack.

Bombs were not the only things dropped during the maneuvers, as the machines which attacked Spezia bombarded that city also with leaflets which ran as follows:

> Italians: In case of war enemy aircraft will not drop colored paper on your towns and homes, but powerful explosives and incendiary bombs. The enemy airmen will fire real bullets, and will drench the streets of towns, not with the white vapor of the air maneuvers, but with a deadly rain of poison. The Italian people want and love peace, but for ages past prudence has taught us that we must not be found unprepared in case of war. Let us not forget that the enemy air offensive will be paralyzed and defeated only if we are powerful in the air, and if we have a strong national air force.

Blind Flying

Aeroplane, August 19.—(By Flight Lieutenant H. F. Jenkins.) The major part of the information relied upon by the brain is that obtained by the eyes, although a little —such as the whistling of the wires in a dive—is obtained through the ears, and again some is obtained by the feel on the seat, etc.

It is, however, definitely established that without the eyes it is impossible to fly for any length of time. The eyes rely on horizons or datum points so that they may convey to the brain the amount of movement, if any, from a datum plane or point in either of the three dimensions of flying.

In these days of advanced aviation, when structural and engine failures are very rare occurrences, the safety of flying almost entirely depends upon the skill, judgment, and airmanship of pilots, and the record of accidents directly or indirectly attributable to pilots being unexpectedly caught in circumstances of bad visibility is regrettably a long one.

Many inexperienced pilots have been sorely tried by the lack of a clear horizon, particularly when maneuvering near the ground, and so get into difficulties when there is sufficient height for recovery. Taking off in conditions of bad visibility has also claimed its quota of accidents.

Encountering fog when making a cross-country flight or being compelled to climb into cloud to avoid high ground has also resulted in crashes. In fact, so high is the proportion of accidents in which the basic cause is inability on the part of the pilot

to orientate himself that this failure can be regarded as one of the principal flying risks.

Shortly after the Great War, the development of blind flying was continued in France, and later, considerable experiments have been made possible in America by Mr. Daniel Guggenheim, who inaugurated a fund for this purpose. It is only recently, however, that the necessity for pilots to be trained to fly by instruments has received recognition in this country and a system of training is now established at the Central Flying School, the premier training unit in the Royal Air Force.

As a result of the developments at the Central Flying School, the definite conclusion has been reached that practically the whole of the risks arising from conditions of bad visibility can be overcome by the training of pilots in the technique of blind flying, and the reliability of instruments specially designed for the purpose has played an important part in making this training practicable.

In addition to the primary object of a training in blind flying, i.e., to enhance security in bad visibility, instrument flying also provided for more accurate flying in more ordinary circumstances than is afforded by its counterpart, "sensory flying," and allows of greater precision for specific purposes such as dead straight runs of short duration for wind finding, vertical photography, or experimental purposes.

The average pilot who has not approached the subject with an open and analytical mind will nearly always claim to be able to fly blind if need be, yet if called upon to do so, usually provides some good excuse. It is probably quite true that the average pilot can fly reasonably safely through a cloud-bank for a very short period of, say, 10 minutes, but tests at the Central Flying School of about 80 keen pilots with flying experience ranging from 300 to 2,000 hours showed that *not one* of them could fly blind safely for more than 12 minutes, even when provided with adequate instruments, without specific training in the use of these instruments.

The reason for this is only apparent when the question of training for blind flying is examined. Certain conclusions are then arrived at unmistakably which throw a light on this very important subject.

Firstly, the process of flying blind is at first unpleasant to such a degree that firm instruction on psychologically sound lines is essential. No pilot can fly merely by his senses without reference to some external datum.

Secondly, instruments do not give a really natural reaction and their use to replace the normal external datum is always, therefore, a matter of effect rather than of instinct.

Thirdly, the senses are not only inadequate for flying blind, but are definitely misleading.

Without elaborating on these conclusions it is necessary to emphasize the last. Nearly all pilots who have tried to fly in a cloud, particularly if they have endeavored to maneuver under these conditions, can admit to peculiar and erratic results. They obey their senses, notably that of deep muscle or "seat" feel and the airplane unfortunately does not behave as it should.

The result is that most pilots come out of a cloud in a steep nose-down spiral and frequently in a spin. The reason for this is always the same and actually amounts to the fact that the pilot is unable to distinguish sensorily between a yaw one way and a wing-down the other.

These shortcomings can, however, be met by proper training in the use of carefully selected instruments. Curiously enough it is found that nearly every error committed in blind flying is due to the misuse of the rudder, in fact, the difficulty of control has been assessed in the proportion—rudder, elevator, and aileron as :—6 : 2 : 1 : for nearly all pilots on at least four widely different types of aircraft, including twin-engined, heavy aëroplanes.

In consideration of the fact that practically all errors are due to yawing, probably owing to faulty use of the rudder, or unappreciated effects of aileron drag, it is evident that the turn indicator must be the basis of instrument flying.

In training, the method which has been adopted as a result of natural evolution enables a pilot to build up his efficiency in stages, starting with the use of the rudder alone, then the elevator alone, then ailerons alone, and then gradually combining any two, and finally all three, until after, say, 8 hours, coördination is achieved.

The pilot who can fly blind in the full sense should be able, entirely blinded, to take off, climb, fly really straight and level, turn to change course as often as desired, spin and recover, recover from any alti-

tude without unnecessary loss of height, glide, and change course on the glide, and be able to correct for nose and tail heaviness or lack of lateral trim.

Such is the standard which should be aimed at when training pilots to fly blind and results have already proved that the average pilot is capable of achieving this with proper training.

In conclusion, it would perhaps be well to emphasize that an enhanced morale is a direct result of ability on the part of a pilot to compete with unexpected or known fog or cloud, and morale plays a very strong part in the ordinary duties of a pilot.

A New British Fighter

Aviation, New York, September.—The famous two-gun bad man of the old American frontier has a modern counterpart in the multi-gun fighting airplane with which practically all first-rate powers of the world are now experimenting. One of the latest of this type is the new Gloster *SS-19,* of which the first delivery has recently been made to the Royal Air Force.

The *SS-19* is a two-bay biplane of conventional appearance, designed as a high altitude fighter. It is constructed entirely of metal with the exception of the fabric covering. The first machine was fitted with a single Bristol Jupiter, radial air-cooled engine with Townend ring and rated at 480 hp. at an altitude of 9,000 feet.

The two-bay structure was selected on account of its greater rigidity to permit violent acrobatics and diving at very high speed. Relatively narrow ailerons of the Frise type are fitted.

The armament consists of two Vickers machine guns carried in grooves in the fuselage fired through the propeller by a synchronized gear. Four other machine guns of the Lewis type are mounted out on the wing well clear of the propeller slip stream. A rack for four 20-lb. bombs is mounted under the fuselage.

Turkey Buys Italian Planes

Tribune, Chicago, September 13.—A contract was signed yesterday at the Italian embassy at Ankara between Premier Mussolini's envoy and Mustapha Kemal Pasha's Turkish government for the purchase by Turkey of 28 Savoia Marchetti seaplanes with Torino motors. This was learned in London today. This records a switch by the Turks from French to Italian planes.

It is stipulated in the contract that the seaplanes are to be delivered before the end of the year, and also that the Italian marine air force is to train 50 Turkish officers to control the machines. It is understood that President Mustapha Kemal Pasha was impatient at France's slow delivery and so turned to Italy.

The planes are to be used against smugglers operating from Syria and against Armenian refugees who enter Turkey by the sea route from the same quarter. The peculiarly indented coast and the international diffusion surrounding the islands, which brings up the question of territoriality, prevents the use of gunboats.

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NOTES ON INTERNATIONAL AFFAIRS

From September 3 to October 3
Prepared by Professor Allan Westcott, U. S. Naval Academy

THE MANCHURIAN CRISIS

Sino-Japanese Clashes.—The intense friction between Chinese and Japanese in Manchuria came to a blaze on the night of September 18 when after alleged Chinese efforts to blow up a bridge on the South Manchurian Railroad near Mukden Japanese troops attacked the Chinese garrison and arsenal at Pentaying, took over police control in Mukden, and sent troops to Kirin and other points outside the railway zone. Numerous subsequent clashes were reported and the Japanese forces in Manchuria were strengthened from 12,000 to 14,400, nearly the 15,000 permitted by treaty. Of the large number of Chinese soldiers in the region, estimated at 220,000, perhaps a third were disarmed by the Japanese. For a time the tension was keen in view of the agitation for aggressive action among the Japanese military forces, aroused by the execution in August of Captain Shintaro Nakamura as a spy, and also the awakened nationalistic feeling in China. By the close of the month this tension had apparently relaxed and Japan had promised withdrawal of troops.

League Action.—Immediately upon the extension of Japanese control in Manchuria the Chinese government protested the action to the League Council assembled at Geneva as a violation of both the League Covenant and the Kellogg-Briand Peace Treaty. China also protested to Tokyo and made some initial proposal for a joint commission to negotiate a settlement, but when Japan at once responded favorably, China as quickly withdrew the proposal, seeing the advantage of securing international support. The League Council's first move was to urge both powers to withdraw troops and abstain from hostile acts. It also informally discussed the appointment of a neutral military commission to supervise the withdrawal. This, however, Japan successfully opposed, as in fact any direct intervention by the league, insisting that the matter should be settled by direct negotiations between the two powers. Meantime an account of the league's action was conveyed to the United States government, and on September 21 Secretary Stimson made a similar separate appeal to both China and Japan. The American communication in this instance was more delicately managed than at the time of the Russo-Chinese conflict in northern Manchuria, and was given at first informally to the Chinese and Japanese representatives in Washington. Japan received it politely, and the coöperation thus established between the United States and the league was hailed as a precedent for future handling of international disputes.

On September 25 the League Council, despite China's vigorous appeals, decided against any further action, and on September 30 adjourned until October 14, unless an earlier emergency should arise. Some effort was made by China to interpret this definite date for the next session, October 14, as a limit by which Japanese withdrawal of troops should be completed.

China Aroused.—A notable effect of the Manchurian crisis was the war spirit stirred in China and among Chinese throughout the world. September 23 was proclaimed a day of "national humiliation." On September 28 Foreign Minister C. T. Wang was seriously injured by a student mob agitating for war, and two days later the Nanking government announced his resignation and the appoint-

ment to his office of Alfred Sze, then Chinese representative at Geneva. Peace negotiations with the rebel government at Canton were begun, with reports at the close of September of a settlement on the basis of which Chiang Kai-shek would retire from the Nanking presidency but retain supreme control of the Army. General Yen Hsi-chan, rebel Shansi leader, was pardoned. To this extent the Japanese war scare served to bring China to at least temporary political harmony.

THREATENED BREAK-UP OF MANCHURIA.—Local political factions in Manchuria seized the opportunity offered by the September friction to start separatist movements in various regions. In northern Manchuria, Mongolian and Manchu princes set up an organization with headquarters at Harbin; another was established at Kirin by old followers of Chang Tso-lin, who had no sympathy with his son Chang Hsueh-liang's alliance with Nanking; and a third movement sought Japanese support for a republic in Southern Manchuria. The chief possible effect of this disintegration would be to facilitate an extension of Japanese control. This the Soviet press generally prophecied, declaring that Japan's aim was to make Manchuria a second Korea, the steps being complete control of the South Manchurian railway, its extension northward and westward, increased immigration, and a further grip on Manchurian trade.

New York Times, September 30.

Three groups are seeking autonomy, the first for North Manchuria and Inner Mongolia, the second for Kirin Province, and the third for South Manchurian Republic.

PACIFIC INSTITUTE POSTPONED.—The Institute of Pacific Relations, which was to have held its fourth plenary session at Hankow on October 21, indefinitely postponed its session owing to the Manchurian troubles. Instead the delegates visiting the East will confer informally with Chinese and Japanese representatives. Russia was to have sent an observer to the conference and has made plans to join the organization, whose membership includes representatives from the United States, Canada, England, Japan, China, Australia, New Zealand, and the Philippines.

LEAGUE AND WORLD COURT

ARMS TRUCE PROPOSAL.—While the September sessions of the League Assembly and Council were much occupied with routine business, such as further codification of international law, amendments to the Covenant to harmonize it with the Kellogg pact, special committee reports, etc., the matters which attracted chief attention in the press were the handling of the Manchurian dispute and the discussion of the proposal of Foreign Minister Dino Grande of Italy for an "immediate general agreement" on suspension of new armament programs. This proposal—which the French press declared was an outcome of Secretary Stimson's visit in Rome—was referred to the assembly armament commission, and non-member nations, including the United States, were invited to join in its discussion. The final decision of the committee, approved by the assembly on September 29, was a resolution requesting all governments to prepare for the February conference by an armament truce, and also requesting all governments to state before November 1 whether they were prepared to accept such a truce to run for a year from that date. The phrase "to refrain from any measure involving an increase in armaments," employed in the resolution, was open to a wide variety of meanings. Nevertheless the ready agreement on such a proposal, as compared with the hesitancy six months earlier over a mere public statement of existing armaments, showed how great a change the world economic depression had brought in the general attitude toward arms restriction.

Hugh R. Wilson, American Minister to Switzerland, acted as America's observer in the league discussion of the truce, and in a statement on September 23 indicated that the United States would join in such action,

though he at first made some reservations as regards naval construction in cruisers and destroyers necessary to bring this country up to her treaty strength. Subsequent moves in Washington indicated that the American government was quite ready to make naval sacrifices also, if they would act as a lever to Western European reductions.

MEXICO ENTERS THE LEAGUE.—Redeeming what M. Briand described as a "lamentable error" when the League of Nations was organized—an error chiefly due to the influence of President Wilson,—the League Assembly at its opening on September 27 adopted a proposal of the chief powers and Spain that Mexico be invited to become a member. The Mexican government in accepting the invitation made the incidental declaration that it had "never admitted the regional understanding" mentioned in art. XXI of the League Covenant, thus clearing itself of any acceptance of the Monroe Doctrine, the regional agreement there referred to.

AUSTRO-GERMAN TRADE PACT BARRED.—The World Court on September 3 by the close vote of 8-7 declared the proposed customs pact between Germany and Austria incompatible with the Geneva Protocol of 1922, by which the Allied powers in granting reconstruction loans to Austria bound her not to "seek to obtain any special or exclusive economic or financial advantage calculated directly or indirectly to compromise her independence." Seven judges also considered the pact incompatible with a similar clause in the peace treaty of St. Germain. Even before the decision was reached, both Germany and Austria had renounced the agreement, while declaring strongly for the more general European tariff pact which is being sought for by a special pan-European union committee.

The close division of the World Court on the Austro-German issue was viewed with some misgiving as apparently a reflection of international political alignments. The judges of France, Italy, Poland, Rumania, Spain, Colombia, Salvador, and Cuba voted against the legality of the pact, while those of the United States, England, Japan, Germany, Holland, China, and Belgium voted for it.

GREAT BRITAIN AND COMMONWEALTHS

ENGLAND STOPS GOLD PAYMENTS.—Despite drastic economies put into effect by the three-party ministry, the drain on British gold reserves continued in September, necessitating use of a part of the $400,000,000 of new credits obtained from America and France. In this second emergency the government on September 21 put through Parliament a measure suspending for six months the Gold Standard Act of 1925 which required the Bank of England to sell gold at a fixed price. While England has never before in recent times gone off the gold standard save in war emergency, the action was viewed with relief in many quarters as a second necessary step toward economic recovery. It will remain for the government, if possible with international cooperation, to reëstablish sterling on a sound basis, even through the pound is fixed at lower than its former value. At the close of September its exchange value stood at about $3.90, with corresponding depreciation in the currency of Canada, India, and other dependencies.

MEASURES OF ECONOMY.—In the budget presented by Chancellor of the Exchequer Snowden early in September, estimated deficits for this year of $374,000,000 and for next year of $826,000,000 were converted into slight surpluses by drastic economies and increased taxation. Reductions in dole, salaries, etc., amounted to $330,000,000 for next year; increased income taxes were expected to bring in $287,000,000; and taxes on beer, tobacco, gasoline, and theaters were counted on to yield $177,000,000 more. By a vote of 306-212 the Commons gave consent to the execution of all these measures by orders in council, without further parliamentary action.

PARLIAMENTARY ELECTIONS.—The announcement on October 1 that Parliament would end or be dissolved on October 7 was taken as assurance that there would be a call for a general election to be held before the close of October. The cabinet being equally divided, five-five, on the Conservative proposal of a higher protective tariff, it appeared likely that the present government led by Mr. MacDonald—would campaign simply on the issue of continuance of

the present régime as best for the country's economic and financial rehabilitation. The Labor opposition will fight the entire economic program. Chief doubt centered in the attitude of Lloyd George and the Liberal party, who favored continuance of the present government in office without elections, as assuring them a balance of power.

THE INDIA CONFERENCE.—In a sea of economic difficulties, and with an election campaign impending, the London ministry found it hard to give adequate attention to the scarcely less important problems of the India Conference. In the Federal Structures Committee, headed by Lord Chancellor Sankey, and working on the new Indian constitution, Mahatma Gandhi on September 15 renewed in conciliatory terms his familiar demand for "equal partnership" and self-rule. Here, as in last year's conference, progress was soon held up by the perplexing minorities problem—the question of safeguards for Moslem and other minority representation in the new Parliament. The first meeting of the special minorities committee came on September 28, at which time Premier MacDonald definitely put the problem up to the Indian representatives as a question they must solve among themselves. To this end Mahatma Gandhi began a series of conversations with the Aga Khan and other Moslem delegates, including Sir Ali Imam, only representative of the small body of Moslems who have joined hands with the Hindu Nationalists.

EUROPEAN POLITICS

SCANDINAVIAN STATES OFF GOLD STANDARD.—In the train of German and British financial difficulties, the governments of Sweden, Norway, and Finland on September 27 felt the necessity of suspending gold payments as a protection for their national reserves. Similar action was soon afterward taken by Denmark. Of the northern countries, Norway, with Soviet rivalry in the lumber trade and decreased demand for ocean transport, has been hit most heavily by the current depression. Sweden is reported on a sound financial and industrial basis, but nevertheless affected by conditions in the rest of Europe. In none of the countries is a permanent lowering of currency values anticipated.

FRENCH MINISTERS IN BERLIN.—The visit of Premier Laval and Foreign Minister Briand to Berlin, September 26-28, took on added importance from the widely expressed view that European economic recovery, and in a measure world recovery, is dependent on a political understanding between Germany and France. In the conferences of the French and German ministers, however, political problems were wisely put in the background and efforts centered on easier and more fruitful plans for economic coöperation. It was agreed that a joint committee be appointed, composed chiefly of manufacturing, financial, and labor representatives of both countries, to work out a definite scheme of collaboration in the economic field, with a special eye to the Russian and Central European markets, in which France should supply primarily the financial backing and Germany the means of production. Tentative plans were also made for revision of the Franco-German commercial treaty of 1927.

Coming close before Premier Laval's visit to the United States in October, the French ministers in their Berlin negotiations were apparently seeking eagerly for results which could be presented in Washington as tangible proof of Europe's efforts to settle her own affairs.

GERMANY'S FAVORABLE TRADE BALANCE. Some prospect of Germany's being able to emerge from her economic difficulties by her own effort was seen in the increasingly favorable trade balance which has prevailed during the present year. In August the surplus of exports over imports was $77,000,000, and for the preceding seven months $364,000,000. At this rate, disregarding reparations and interest payments, Germany might be able to recover a large part of her short-term foreign credits by the close of the year. The excess of exports, however, has been brought about largely by necessarily decreased purchase of raw materials from abroad, and such purchases cannot be held down indefinitely.

JUGOSLAVIA ENDS DICTATORSHIP.—On September 2 King Alexander of Jugoslavia somewhat unexpectedly ended his three years of dictatorial rule by proclaiming a revised constitution and the restoration of parliamentary government. The new constitution is not greatly different from the old

except that it creates a parliament of two bodies instead of one—a senate half elective and half appointed by the king, and a lower chamber elected for four years. The recent division of the country into provinces or *banats*, to break up the old racial groups, is continued, but the provinces receive an increased measure of home rule.

The change back to constitutionalism was viewed abroad as another instance of French pressure facilitated by the loan of $42,000,000 to Jugloslavia last May, the feeling in France being that Jugoslavia's military and political strength would be increased by ending the dictatorship as a concession to Croatian and Slovene malcontents.

AUSTRIA'S ONE-DAY REVOLT.—The long threatened *putsch* of the Austrian *Heimwehr*, in which organization the nationalistic or Fascisti sentiment of the country is centered, took place on September 13, when Dr. Walter Pfriemer, *Heimwehr* leader, seized public buildings in Styria, called for an uprising of all *Heimwehr* troops, and proclaimed himself national dictator. The affair started prematurely and was completely abortive. Only half a dozen casualties were reported and before night Pfriemer was in flight, and Prince von Staremberg, former Minister of the Interior and *Heimwehr* leader, was in custody. The chief effect was to embarrass Austria's efforts to secure further financial loans at Geneva.

UNITED STATES AND LATIN AMERICAN

GOVERNMENTAL WHEAT SALES.—Success of the U. S. Farm Board in negotiations for the sale of American wheat through foreign government agencies was marked by three large transactions in late August and September. The first was an exchange of 25,000,000 bushels of grain to Brazil for an equivalent value of coffee at current prices; the second was a sale of 15,000,000 bushels to China on credit; and the third a transfer of 7,500,000 bushels to the National Purchasing Agency of Germany at a price of approximately $.50 a bushel, on a three-year credit guaranteed by the government. Preference for shipment in American vessels, not provided for in the Brazil agreement, is stipulated in the arrangement with China, and also to the extent of half the cargoes in the arrangements with Germany.

REVOLT OF CHILEAN FLEET.—An affair reminiscent of the Spithead mutinies of the British fleet in 1797 took place in Chile in the first week of September when seamen of the Chilean Navy, threatened with pay cuts, took over control of vessels at the Coquimbo naval base. Initial overtures made by the government through Admiral van Schroeder were unsuccessful. Naval cadets at Valparaiso and forces at the Talcahuano base joined the revolt but were overcome, the latter after considerable fighting. The ships off Coquimbo, short of food and coal and generally demoralized, finally surrendered after a fifteen-minute airplane bombardment which did little or no actual damage. In subsequent courts-martial the death penalty was invoked for only a few leaders. In new skeleton crews for the ships, about 10 per cent of the old crews were retained. While there is plenty of communistic doctrine circulating in Chile itself, press reports traced the beginnings of the uprising to radical ideas picked up in Clyde dockyards when the *Almirante Satorre*, built for Chile in England in 1911, was modernized there in 1929.

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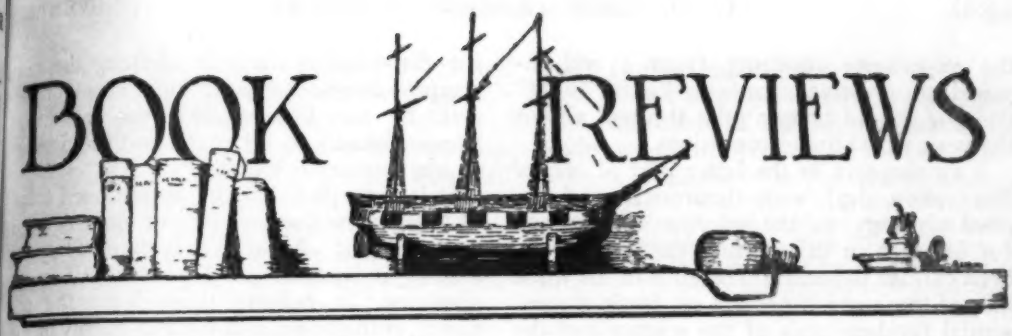
OPTIMISM, *therefore, is not always without danger, but pessimism is far more perilous.*—LE BON.

BOOK REVIEWS



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AËRIAL NAVIGATION. By Lieutenant Commander P. V. H. Weems, U. S. Navy. New York: McGraw-Hill Book Co. 1931. $5.00.

REVIEWED BY LIEUTENANT COMMANDER D. C. RAMSEY, U. S. NAVY.

Lieutenant Commander Weems's latest contribution to the art of aviation appears at a timely moment. While knowledge is fresh in mind of the splendid achievement of Post and Gatty in flying around the world in less than nine days it is appropriate that an appraisal should be made of the various factors which entered into the problems of that flight. An analysis clearly shows the outstanding importance of accurate navigation. Although the sustained courage and endurance of the airmen and the superb performance of their plane and engine marked the effort as one deserving of success, slipshod methods of position keeping and uncertain landfalls easily might have brought on failure or even disaster on any of the long legs of the flight. There is a great lesson in the Post-Gatty achievement to all aërial navigators of the future.

It is only fair to the author of this book that publicity should be given the fact that the navigator of the *Winnie Mae* was one of his pupils and a disciple of the Weems systems of determining position from aircraft. The public acknowledgments made by Mr. Gatty of the author's contribution to this flight cannot fail to inspire interest and enhance confidence in a work which already carries with it the prestige of Lieutenant Commander Weems's reputation as an authority in the field of aërial navigation.

It will be obvious to the reader that this book represents years of labor. No effort has been spared to make it complete, comprehensive, and up to date in every detail.

The efficacy of the author's systems of aërial position finding is not unduly stressed. The aim has been, rather, to examine all approved methods and to point out the conditions and circumstances under which any particular system might be used to the best advantage.

One point emphasized by the author is the popular but fallacious idea that the establishment of position in flight by observation of heavenly bodies calls for tedious and involved computations. Here, he aptly and conclusively shows that when flying under normal conditions of visibility, over strange terrain or over the open sea, the processes of position keeping by dead reckoning alone are more tedious, complicated, and liable to error than position fixing by astronomical observations. This assumes, of course, that the aërial navigator is equipped with the necessary instruments, tables, and accessories and a working knowledge of the simple short cut systems of astronomical triangle solution described in the text.

Interesting and illuminating portions of Lieutenant Commander Weems's book are given over to the treatment of instrument flying and the practical use of the radio direction finder. Here the reader is introduced to the most serious problem of aërial navigation; the problem of holding course and maintaining the ship on an even keel when all outside points of reference are obscured. While the author of this review shares with the author of the book the belief that flying under such circumstances should be avoided whenever it is possible to do so, he shares, likewise, the opinion that judicious choice and use of equipment combined with

the experience resulting from a self-imposed progressive course in "blind flight" training should carry a pilot through all but the very worst flying conditions.

Two chapters in the latter part of *Aërial Navigation* deal with theoretical and applied aërology. In the selection of material for his text in this section the author has been careful to maintain balance in his work but, at the same time, has set forth the essential fundamentals of the science and the art of forecasting weather. Too much importance cannot be attached to the ability of the long distance or over-seas flyer to interpret correctly the significance of sudden shifts of wind and to seek the altitudes and zones where drift components favor the flight. Frequently he will be thrown on his own resources in this matter. Under these conditions there can be no substitute for a well-founded knowledge and understanding of the elements.

In the final chapter of the book, the author projects us into the future. We embark in a tri-motored plane at Chicago and take off on a regularly scheduled round-the-world flight. The logical route is easterly; the planned circumnavigation to be accomplished in flights of approximately seventeen hours duration. The assumed cruising speed of our plane in still air is 100 knots. The equipment carried includes instruments, tables, and paraphernalia needed to establish position by radio direction finder, astronomical observation, and dead reckoning. As the time of take-off is set we can accomplish much of our navigational work in advance. This has been done in the hope that the celestial bodies selected for observation will be in sight at the times for which our preliminary calculations have been made. Chances of this are always favorable. There is nothing lost in any case. A final survey of the weather map and we are off, holding the line of the Chicago radio beacon for the first 200 miles and when this fades out beginning our navigation work in earnest. There is low fog so we seek the higher altitudes and are rewarded by a sight of our selected stars. A fix, checked by a meridian altitude of the moon and our dead reckoning begins anew. The fog lifts. We drop to 1,000 feet and establish another fix by piloting. Davis Strait looms up; we are on time, but the wind strengthens and is setting us to the south. Two drift sights as we leave the coast and proper allowance for the wind is made in shaping the new compass course—an additional check on the drift by sun line as we cross the strait. Frederikshaab, on schedule, and the first leg of our journey is over.

It is regretted that the apportioned scope of this review does not permit more detailed treatment of *Aërial Navigation*. Only by reading it from cover to cover can it be appreciated. It reflects throughout the patience, enthusiasm, and tireless energy of the author who has given us an excellent work; an outstanding contribution to the library of aviation literature.

AËRIAL AND MARINE NAVIGATION TABLES. By Lieutenant John E. Gingrich, U. S. Navy, New York: McGraw-Hill Book Company, Inc., $2.50.

REVIEWED BY COMMANDER G. T. RUDD, U. S. COAST AND GEODETIC SURVEY.

(Author: *Rude Star Finder and Identifier*)

The requirements of the aërial navigator for simple, compact tables for celo-navigation have resulted in marked improvements in the methods and data furnished the marine navigator. The latter was once content with bulky tables and time-consuming methods. Not so the modern navigator. He now requires, as does his brother of the air, tables which combine accuracy, simplicity, and facility of use. The rearrangement, in recent years, of the tables of Doctor Ogura of the Japanese Navy by several American navigator-authors has resulted in the development of compact tables by the use of which the same plan can be followed in the solution of all sights and with an accuracy comparable with the older and more cumbersome methods. Lieutenant Gingrich's *Aërial and Marine Navigation Tables* consist of a rearrangement of those of Doctor Ogura and others. Their essential difference from the *Line of Position Book* by Lieutenant Commander P. V. H. Weems, U. S. Navy, is that azimuth diagrams are used by Commander Weems in his book whereas in Lieutenant Gingrich's tables the azimuth is calculated by a table similar to Lecky's "A B C Tables." Little extra work is required in obtaining from the tables the values for obtaining the azimuth. Personally, the present reviewer prefers the tables; others, no doubt, prefer the diagrams. About the same time is required in either case.

In addition to the altitude and azimuth tables, the book contains the following use-

ful tables: Conversion of time into arc and the reverse; correction to observed altitude of sun's lower limb; correction to observed altitude of star or planet; speed-time-distance, and total correction to the observed altitude of the moon's lower limb.

The first few pages are devoted to a brief but clear description of the method of solution, with examples of sun and star sights, followed by an explanation of the tables; that is, the formulas used.

Page 7 of this publication contains a description and example of the use of the tables for determining the great circle course and distance similar to the solution of the same problem by use of cosine-haversine formula of the Marcq Saint-Hilaire method. The method is simple and the explanation furnished by Lieutenant Gingrich is clear and concise.

While the publication consists principally of a rearrangement of tables already extant, it will prove of assistance to the aërial and marine navigator. Its format is excellent and it is printed in a bold-face Roman type quite easy on the eyes, except possibly that the type is a little heavy for the compactness of Table B.

NAVAL OPERATIONS, Vol. V: 1917 to the Armistice. By Sir Henry Newbolt. London: Longmans, Green & Company. With accompanying volume of maps. 1931. $12.50.

REVIEWED BY LIEUTENANT COMMANDER T. L. GATCH, U. S. NAVY

This is the concluding volume of the official history of the World War, prepared by direction of the historical section of the Committee of Imperial Defence of Great Britain. The first three volumes of the work were written by the late Sir Julian Corbett, the eminent naval writer, and his volumes have been well sustained. This final volume is of course vitally interesting to an American; for no matter how inconspicuous a part a reader may have played, the history of events in which he was concerned is engrossing.

This history is almost purely factual, and that is one of its outstanding merits; for not until another generation studies the last war can any other kind of history well be written. A later historian will necessarily depend largely upon the work of Corbett and Newbolt, and the advantage that the start can be made here instead of going back to the original sources is incalculable. The magnitude of the labor entailed is adumbrated in the preface of this volume:

> By the beginning of 1917 about a thousand telegrams dealing with events in Home Waters alone were being sent and received by the Admiralty in every period of three days. That is to say, that for the events of a single year in a single field of action the historian and his staff must consult 120,000 telegrams and make careful notes upon them.

And telegrams are the smallest part of the records. The reader is impressed more and more as he reads this volume that insofar as the British sources can provide everything is published.

By the end of April, 1917, there was no possible doubt in the mind of anyone conversant with things that the German submarine campaign was going to win the war for Germany, and that in not much longer than the six months the war lords had promised. Hindsight is so sure—hence the jibes of the amateur strategists who always know so much, but always afterwards. Of course the convoy system was the answer; it should have been instituted at the outset; then the Allies would have been spared the darkest days of the war. But in April, 1917, no one knew that, not even the amateurs. The institution of a convoy system had been under serious consideration for a long time. It was not until April 26 that the Admiralty consented to try it, and then it seemed almost a policy of desperation. Something had to be done, what else was there to try? On the face of the theoretical discussion it is impossible to see why the convoy system should have been such a success. What better could a submarine commander ask than to come up in the middle of a helpless unwieldy convoy, each ship afraid to shoot for fear of her consorts, a few destroyers around the edge unable to get in because of the scattering merchantmen? The U-boats had proved that they could go under closely patrolled barrages with considerable impunity. Why would they not go under an escort into a convoy? The greatest real reason for the success of the convoy system, as events were to prove, was the power of evasion a convoy had. By careful continuous plotting of submarine positions, by careful frequently changed routings, convoy after convoy was run through without a U-boat getting a chance at it. The author points out that this power of eva-

sion was not seriously advanced as an argument by any of the proponents of the convoy system. When Admiral Sims arrived in London the Admiralty was still opposed to the convoy; Admiral Sims immediately fell in with their views and so informed Washington. Apparently Washington was in accord with this opinion; for when the Admiralty changed, two or three weeks later, the United States could not keep up.

In their opinion, transmitted by cable to the Admiralty, defensively armed vessels were safer than vessels under convoy; and early in May, when the Navy Department at Washington was asked to assemble a convoy of from sixteen to twenty Allied vessels, and to send them across to England under the escort of a group of American destroyers which were then about to leave, they answered that they considered the ships to be escorted were too numerous and that they ought only to sail in groups of four. The proposal was, therefore, not pressed, the destroyers sailed by themselves, and the merchant ships crossed singly without escort.

Providence was allied with the Allies. One of the practical objections to the convoy system was that sufficient escorting vessels could not be found without dangerously weakening the screen of the Grand Fleet. Then the United States entered the war and our destroyers, a drop in the bucket, were just sufficient to eke out those that the British could detail to escort duty, and so make it possible to put the system in effect both to the northward and southward of Ireland. Later in the Mediterranean, when the sinkings became dangerously numerous there, our old coal burners and patrol craft made just enough to allow the Mediterranean convoys. Moreover, the entry of the United States into the war made it possible to effectuate the scheme of Sir Leo Chiozza Money to draw supplies from Canada and the United States as far as practicable, and thus have the bulk of the shipping on the shortest and safest routes.

Economics is not very exciting. The entire submarine effort was economic warfare. On either side there were brave men a-plenty, doing their prescribed work well; and yet there were no inspiring events, no pulse-quickening names, produced in the whole long grueling campaign. The anti-submarine forces finally won:

Never in the history of warfare has a great victory been reported with so little clamour and emotion. The figures of shipping losses which recorded the achievement were printed in a few statistical returns; those returns were circulated to the persons who were entitled to read them, and that was all. The reason is that nobody could say that the victory was won on a particular day or that it was connected with a particular event in the daily succession of events at sea. There is nothing by which to remember it. It was, moreover, the outcome of a vast composite exertion, in which the Allied admirals . . . the officers of the subordinate committees, and the officers and men at sea conjointly contributed. No single individual had a right to say *quorum pars magna fui* and none claimed the right. The splendour of the achievement cast an equal lustre upon all. This dateless victory at sea was decisive according to the strictest definitions of decisive victory.

One must turn to the so-called "side shows" of this last year and a half of the war at sea for thrilling action. The valiant fighters of the Revolution and of 1812 sent their spiritual descendants to the mole at Zeebrugge. The forthright account of the night at Zeebrugge in this book is one of the most stimulating pieces of writing that will be found in many a day; the facts speak for themselves. Another time we see Lieutenant Commander Fox in the ill-starred *Mary Rose* driving to within 2,000 yards of the cruisers that were raiding the Scandinavian convoy. A foolhardy thing for Fox to do. Yes, almost as foolhardy as Commander Rizzo's attacking a battleship with a motor boat—except for the result. For that matter, it was almost as foolhardy as a cruise one John Paul Jones once made in an ill-found Indiaman around the British Isles. Such fools are loved.

On July 19, 1917, the crew of the *Prinz Regent Luitpold* became openly disobedient. For the next month conditions in the German Navy were bad. The Germans were spending most of the time in port, and were living, compared to the British, an easy life. It was the old story; a fleet that stays in port rots. Thereafter conditions improved for a time, but at the end the German fleet steamed down a long double line of Allied ships to Scapa Flow. "The commander in chief . . . regarded the whole matter as an act of administration which was hardly worth describing." In that spirit this fine book is written; heroics are eschewed.

Courtesy Brigadier General George Richards, U. S. Marine Corps

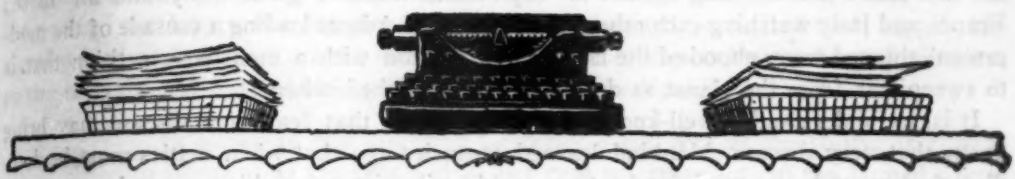
U. S. NAVAL ACADEMY FOOTBALL TEAM OF 1890

Bottom: Pearson, '93; Laws, '91; Althouse, '91; Beuret, '92.
Middle: Syminton, '92; Emrich, '91; Johnson, '93; Hartung, '91.
Top: Macklin, '92; Trench, '93; Irwin, '91; Lane, '91; Ward, '93; Smith, '91.

ARMY-NAVY FOOTBALL GAME, 1890

Courtesy Brigadier General George Richards, U. S. Marine Corps

SECRETARY'S NOTES



Hope "Of the public service, that of the Navy is the one in which tempering may be of the greatest danger, which can worst be supplied upon emergency, and of which any failure draws after it the longest and heaviest train of consequences. I am far from saying that this or any service ought not to be conducted with economy. But I will never suffer the sacred name of economy to be bestowed upon arbitrary defalcation of charge. The author tells us himself 'that to suffer the Navy to rot in harbor for want of repairs and mariners, would be to write destruction.' It would be so. When the author talks therefore of saving on the Navy estimate, it is incumbent on him to let us know not what sums he will cut off, but what branch of that service he deems superfluous."

Yes, but if the facts are that economy is actually being practiced to an extent that some regard as extreme, wherein the hope. Simply this: the above quotation is from Edmund Burke in the year 1769.

Disarmament The *State Journal* of Lansing, Michigan, recently had an editorial, occasioned by the attack of a mob of Chinese students made upon Foreign Minister Wang, that should provoke considerable thought among the pacifists. One of the fondest fetishes of pacifists of all periods has been that the people are against war, and that a popular referendum of war should be had before war can be declared. The trouble with this idea is, as the *State Journal* points out, that it runs counter to history, and is running counter to history in the making today. The *State Journal* cites the cases of the United States in the World War and in 1898. It could have gone farther and shown that there has never been an unpopular war in the United States except in New England during the War of 1812, and the opposition there ceased as soon as the privateers began to reap a harvest.

The trouble with any pacifist movement is that everyone so whole-heartedly agrees with its aims that he gets all enthusiastic until he comes to the means proposed for achieving the aims and finds them contrary to history, if they are not half-baked, or puerile.

The big pacifist idea at the moment is disarmament. Not only is China today almost completely disarmed—for the internecine wars that have ravaged it touch an almost negligible percentage of its population—but John Chinaman himself is inherently the most peaceable man in the world. The pacifists lately, following the military axiom of striking the weakest part of the enemy line, have trained their heavy artillery upon the Navy. China has no Navy. If China went to war with Japan today the Chinese armies would be decimated.

At the present moment as one glances over this best of all possible worlds one sees Japan struggling over the chaos in Manchuria; "Saint" Gandhi in London solemnly asserting

ARMY-NAVY FOOTBALL GAME, 1890

Courtesy Brigadier General George Richards, U. S. Marine Corps

that liberty for India is worth 20,000,000 lives; the Hitlerites or Nazis, or what you have —anyway with decided views as to the proper anti-pacific policy of Germany—apparently rapidly getting control of that country; Russia building, and making no pretense of hiding the fact that she is building against the capitalistic world a great army and air force; France and Italy watching each other; and Miss Jane Adams leading a crusade of the modern enlightened womanhood of the land to Washington with a monstrous petition that is to sweep war from the planet as dust is swept from the kitchen.

It is, we understand, a well-known pathological fact that fear of a disease may bring about that very disease. Mankind learned centuries ago that when nettles must be handled they must be grasped firmly. One could easily picture, at this present juncture, our Western world and Japan arrayed in just might, telling all the rest of the world to keep their squabbles down; grasping the nettle firmly, and doing something. But one could hardly picture sending monstrous petitions to the one and seventy jarring sects of Manchuria, and doing much. One could imagine all this interminable talk of peace when there is no peace, stopped, and the world far more peaceful than it is today. At any rate there has been talk *ad nauseum* of peace since the World War, and there has been less peace in the world since that war than there was in the preceding thirty years. In fact, if memory serves, the world began to get touchy, and war began to brew, just about the time that they began to talk about peace at the Hague Conferences, many years ago.

Hull House has done untold good. The shoemaker has his last.

Our Old Destroyers Naval officers glancing at the lines of the banana carrier shown on pp. 1553-55 will first be struck with the familiar look of her lines; and then suddenly realize with a shock that it is a destroyer hull upon which his eye has fallen. And it will be an unusual destroyer skipper that will not wince a little at the thought that perhaps this was an old command of his own. He will visualize her as a trim and snappy man-of-war ready for a frolic or a fight. And it won't matter much whether he is recalling a fleet review, or a good "admiral's inspection," or the sigh of satisfaction and relief over some successful night attack at full speed.

One of our associate members who sent us the pictures writes:

The SS. *Tabasco* was formerly the destroyer *Putnam* and has been converted into a bánana boat by the Standard Fruit Company. The *Dale* and the *Osborne* are to be similarly converted. The *Tabasco* is powered with two Ingersoll-Rand Diesel engines of 750 horsepower each which give her a speed of 16 knots. She has a capacity of 25,000 stems of bananas which I believe is somewhere in the neighborhood of 1,000 to 1,200 tons. She will ply between New Orleans and Frontera, Mexico, making the trip in forty-eight hours, a considerable saving in time over that made by an ordinary banana boat. She has a crew of nineteen men and will make her maiden voyage in a day or so. The conversion was done by the Todd Dry Dock and Construction Company. The conversion took sixty days to complete, and cost $200,000 including the cost of the hulls. No ventilation (by that I mean no artificial refrigeration) is necessary as the boats make the trip in quick time and also the holds are well aired by deck ventilators. The lower operating costs of these boats as compared to the ordinary type of fruit boat due to Diesel operation, small crew, etc., make it possible for these boats to lay bananas on the dock at New Orleans for eleven cents a stem (estimated) as compared to twenty cents. Also their shallow draft is a great advantage in operating in waters heretofore closed to the regular type of ship. They can navigate the Grijalva River for seventy miles inland to the plantations, thus rendering unnecessary the transportation of bananas to the coast by rail.

Logical "Screaming motorcycles cleared the way one day last week for a long line of automobiles which were taking the Peace Caravan to City Hall. The Peace Caravan consists of fifty ladies who are touring the country arranging with mayors and

governors to put a stop to wars. Well, just before the Caravan left the Hotel Woodstock, one of the women leaned out of her automobile and spoke to the starboard motorcycle cop. 'Please take off that pistol,' she said, sternly, pointing to his service revolver. The cop got all red and mumbled something or other. 'We are for disarming everyone and everything,' the lady continued, firmly. 'Yes, Ma'am,' said the cop. Just then, happily, the signal was given and the Caravan started off, the motorcycles out-screeching the women, so the officer didn't have to throw his gun away."—*The New Yorker*

A Contrast In bankrupt and disarmed Germany 2 per cent of the budget is applied to payment of the debt and 21 per cent to armament. In the United States the corresponding figures are 9 per cent and 18 per cent.

"Old Ironsides" Pamphlet About the first of August we published our little pamphlet *Some Stories of Old Ironsides.* Already more than 25,000 copies have been sold and the demand continues. These interesting stories and eight excellent duotone illustrations are bound in an attractive blue cover that carries a colored print of the *Constitution.* As we mentioned before, all profits go to the Navy Relief Society. It may interest our readers to know, that we were recently asked to quote a price on large quantities with a view to distributing them to all school children in one of America's largest cities. Although the price is but twenty-five cents, we believe there is no American boy that would not welcome a copy on Christmas morning.

"Cormoran" Those who remember Commander Bartlett's article on the destruction of the *Cormoran* published in the August issue may be interested in the following extract from a letter that Kapitan zur See A. Zuckschwerdt recently wrote to the author:

I may be permitted to mention another part of my official report re to Lieutenant Commander Cronan. My report reads as follows: "Then also U.S.S. *Supply* with full speed to harbor and lowered all boats to our rescue. We first saved the most weak ones and offered them medical assistance. Two men were taken on board the *Supply* where they were taken care of with the utmost courtesy, but only their death could be stated. I wish to pay a compliment to the chivalrous attitude of the commanding officer of the *Supply,* Lieutenant Commander Cronan, who always kept up good friendship with us. When our boat neared the ship he ordered the whole crew to stand attention, a bugler blew a signal of honor, the commander descended the gangway, saluted, and said: 'Captain Z., you are a brave man.' I answered: 'I am sorry, Sir, that this had to happen.' I wished you would have mentioned this little incident which honors you and the spirit of your wonderful Navy."

It is a virtue of human character that evil events are soon forgotten and that agreeable happenings prevail in our mind and are being remembered. So I remember my stay at Guam always as a cheerful episode in my life. . . .

The Lighthouse at Tripoli We recently received the following letter from the naval attaché of the Italian Embassy at Washington:

In the September issue of the United States Naval Institute PROCEEDINGS, page 1201, there is a photograph of the lighthouse at Tripoli, Tripolitania, which is reported as being at Tripoli, Syria.

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Special Notice

Naval Institute Prize Essay, 1932

A PRIZE NOT TO EXCEED FIVE HUNDRED DOLLARS WITH A GOLD MEDAL, and a life membership in the Institute (unless the author is already a life member, in which case he will receive the commuted value thereof), is offered by the Naval Institute for the best essay submitted on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1932.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1932.

6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the NAVAL INSTITUTE PROCEEDINGS as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

7. Articles should be limited to approximately 8,000 words, but shorter articles will receive equal consideration.

8. In event of the prize being awarded to the winner of a previous year, a gold clasp suitably engraved will be given in lieu of the medal.

9. All essays must be typewritten, double spaced, and submitted in duplicate.

C. H. McMORRIS

Lieutenant Commander, U.S.N., Secretary-Treasurer